POPULAR Computing WEEKLY

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BRITAIN'S BEST-SELLING MICRO WEEKLY

News Desk

Imagine — back from the brink

by David Kelly

IMAGINE the flamboyant Liverpool-based software house has suffered a hitch in its plans to dominate the home computer games market

Some 30 software titles — six games with versions for five micros — written under contract have been rejected by their proposed publisher, Marshall Cavendish The games were to have been used to support a new micro magazine part-work from Marshall Cavendish called *Input* at present being test marketed in the Border counties

Explained Imagine's general manager Bruce Everiss There was a difference of opinion in the interpretation of our agreement with Marshall Cavendish so the contract was terminated amicably "

Unfortunately this has suddenly left Imagine with three finished and four partly completed games programs One — *Pedro* for the Spectrum Commodore 64 Dragon, BBC and Electron computers — will

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Imagine co-founder Dave Lawson (right) with programmers John Gibson (left) and Eugene Evans

Compensation from Sinclair

SINCLAIR has now agreed to compensate QL customers whose money is being held in a readers trust account, while they wait for their machines to be delivered (see *PCW* 1-7 March) This compensation is in lieu of returning the interest earned on the money

According to a Sinclair spokesman the company has now agreed in principle to compensate customers whose cheques have been cashed with a gift The exact form or value of this gift is not clear

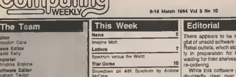
It may however be possible to force Sinclair to return interest accruing from money cashed The National Federation For Consumer Goods has devised a legal clause which can be used to protect your money and your interest

It advises that Sinclair customers should write on the back of their cheque or postal order the following

This money is sent on the condition that you will hold it as a trustee on my behalf, and that it will remain mine until the goods have been sent to me As from 28 days after you receive this money you will also hold on trust for me any interest which is earned on it If you accept this payment you will be

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This Week



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How to submit articles
Articles which are submitted for publication should *not* be more then 3 000 words long The articles and any accompanying programs, should be original It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work

This Week

Editorial

There appears to be something of a glut of unsold software at the moment Retail outlets, which stocked up heavily in preparation for Christmas, are waiting for their shelves to clear before re-ordering

While this software pile-up will undoubtedly clear over the next few months, it does present some of the software houses with a cash-flow problem

Companies with large fixed costs and little money flowing in will be under pressure to increase revenue There are a number of strategies they can adopt, ranging from a massive marketing campaign (which is expensive) to bundling software together (ie, two tapes for the price of one) Perhaps the most likely solution is to cut the price of the software, in the hope that it will encourage more people to buy it

However, although Imagine has already announced that its prices are coming down, there is unlikely to be a software price war Initially at least, other software houses will probably wait to see what effect this price cut has on sales Those houses with extremely good, innovative pieces of software, may well argue that they do not need to reduce their prices in order to sell their games They will sell anyway

It is the poorer quality software that is most likely to be marked down

Next Thursday

Skull Trap, next week's game for the Commodore 64 by James Marsden, is a strategy game. You must destroy the seven playing pieces of the computer by laying mines, but avoid getting trapped yourself.

Sinclair

continued from page 1

deemed to have accepted these conditions

Sinclair will then be faced with the choice of accepting the money and your conditions or sending it back and losing an order — very much the same sort of choice it has itself offered customers — carry on waiting or have your money back

Sinclair has also admitted for the first time that it has been development problems with the QL that has caused the delay to deliveries, and not 'phenomenal demand' as was originally claimed

When it launched the QL it had no QL machines in stock and design work was still continuing The SuperBasic Rom was not finished and neither were four Psion software packages which are to accompany the machine

Some sources also suggest that there may be problems with the design arising from the use of the Intel 8049 chip to handle the keyboard

First deliveries of the QL are now expected at the end of March Some customers ordering machines have now been notified by Sinclair not to expect delivery before the end of June

For £1 the National Federation For Consumer Goods will send you its kit giving legal advice and stickers to attach to cheques Write to NFCG, 12 Moseley Street, Newcastle Upon Tyne

● *PCW*'s QL order: Week 7 Sinclair has confirmed it hopes to deliver before Week 11 The estimated interest gained by Sinclair from our money so far is £2 25

Imagine

continued from page 1

now be sold by Imagine itself The company is trying to sell most of the remaining titles to other software houses It seems probable that two more will turn up among the introductory software packages given away to purchasers of the new, as yet unlaunched, Amstrad microcomputer

To further increase Imagine's embarrassment, Marshall Cavendish forked out a substantial sum of money — rumoured to be in the region of £¼m — to Imagine before work on the games began Imagine must now pay this back in 12 monthly instalments, beginning in April

Imagine general manager Bruce Everiss 'a difference of opinion with Marshall Cavendish'

Imagine has also announced to the trade that it intends to reduce the retail price of all its existing games software from £5 50 to £3 95 in the near future

Parallel with this plan, the company is in the process of splitting its marketing and software production operations into separate companies Creative Technology Group has been formed to look after the company's 60-strong programming team while Imagine Soft were will function solely as a marketing company An advertising production company, Studio Sting, in which both Imagine founders Mark

Butler and Dave Lawson had a stake went into liquidation in late 1983

English Lit. swotters

EASTER holidays mean impending exams for most students, so Penguin Study Software has aptly chosen the end of March to launch its English literature revision programs

The first titles available are all Shakespeare plays — *Macbeth, Henry IV Part I, Twelfth Night, Romeo and Juliet, Julius Caesar*, and *The Merchant of Venice*

All are for the 48K Spectrum, but Penguin will be launching BBC/Electron versions in May By August, the six titles should also be available for the Commodore 64.

Penguin admits that the programs will be slightly more cumbersome to operate on the Acorn machines, because of their smaller memory But they stress that the same amount of data will be available

Donald McFarlan, Commissioning Editor for Penguin explained that the programs are intended mainly for private study and home use

The programs are designed to help 'O' Level students The user can choose which characters in the play to follow up' in terms of related themes and the Acts they appear in

For example, having chosen "Witches" on the *Macbeth* program, you can then go on to select a theme from the wide variety listed to see how — or if — the Witches are related to that topic You can narrow the choice down further, and specify the Witches' participation in each Act Likewise you can 'look up' the themes involved in each Act

The programs were written by Stewart Martin and John Mahoney, two Kent school teachers who are also computer buffs

Penguin intends to expand its range of titles By this time next year it hopes to have a comprehensive set of literature titles — not just Shakespeare — in program form It also plans to move into five other subject areas — Maths Physics, Chemistry, Biology, and Geography

UOSAT launched

THE University of Surrey has now successfully launched its latest amateur radio satellite

Electric car

SINCLAIR has announced that it is in the final stages of negotiations with Hoover to manufacture its first electric vehicle

If talks are successful Hoover will assemble the car at its Merthyr Tydfil factory in South Wales Production of the low cost town runabout later this year

The car is the first of a number of models planned over the next five years by Sinclair Vehicle Project Negotiations are continuing for the other vehicles to be manufactured at the former DeLorean car plant in Northern Ireland

Silicon glen

THE numerous micro chip manufacturers who have set up factories in the Livingston area of Scotland will not have to import silicon for much longer

A leading Japanese silicon producing company — Shin Etsu Handotai — has announced a £30m plan to set up a plant in the area This means that the complete semi conductor process will be contained in Scotland's "Silicon Glen" At the moment, firms are having to import raw silicon from Holland and the USA company hopes to be producing 100m silicon wafers a year Construction of the new plant will begin later this year

Fourth name for Flan

FLAN Computers, having changed its name from Elan Computers just two weeks ago (see *PCW* February 23) now looks set for yet another change

According to Mike Shirley, Flan Computers marketing manager, the company plans to announce details of the new name within two weeks

"We want to come up with a really good name that goes well with the company and Flan' obviously isn't very suitable "

If Flan does change its name once again it will be the fourth such change they have undergone

● PCW is offering a free 12 month subscription for the best suggestion of a new name for Flan


WHO ARE
LORDS
MIDNIGHT
The first SPECTRUM
Game to feature
LANDSCAPING

Letters

Manual bugs

Being a newcomer to computing, it is possible that this error has been pointed out several times in the past but here it is anyway

I have a Commodore 64 and on page 161 of the User's Guide is a misprint In voice 2, the waveform value should be *Poked* into 54283, not 54285 Also, the S/R value is located at 54285, not 6

I was about to return my computer under guarantee before I realised the fault was in the manual, not the computer

John Walton
4 Franks Close
Harlow
Beds

Quick lash-up?

We all know that — according to the dictionary — QL does not stand for 'Quantum Leap', rather it stands for 'quantum libet' (or 'As much as you please') QL is often written at the bottom of pharmaceutical prescriptions when there is no recommended or maximum dosage and the sufferer can take as much as desired

I have been told (obviously by some malicious person) that within Sinclair Research, QL is taken to stand for 'quick lash-up Has anybody any idea what is the true meaning? Any offers?

Boris Allan
Address unknown

Character set

I write concerning a letter in your Peek & Poke column in *PCW* 19-25 January The question was about adding a "proper" printer to a 48K Spectrum The query was about Spectrum graphics and user defined characters

Provided the printer has a download character set, this is possible I use an Epson FX80 with a Kempston parallel interface. All keywords come out as keywords (thanks to Kempston), all the normal character set and block graphics come out as per Spectrum character set (*Chr$ 32* to *Chr$ 143*) The user defined graphics I have arranged to come out as italic capital letters (*Chr$ 144* to *Chr$ 164*) to stand out from normal capitals The Kempston software allows you to specify normal capitals if you prefer

With my routine, you need the Kempston normal machine code driver altered, as per instructions in that program So you see it is possible (although complex and expensive) to print out *all* of the Spectrum character set (including graphics) The high resolution screen dump supplied graphics off the screen Personally, I prefer graphics not to come out in listings, since it is impossible to tell which key to press

Dilwyn Jones
4 The Crescent
Bangor
Gwynedd
North Wales LL57 2AA

Spectrum v World

In the continuing saga of Spectrum versus the rest of the World, as a besotted owner, I make the following comments

1) The only really valid criticism, "the horrible rubbery keyboard", is easily overcome by buying a proprietary keyboard from any one of at least thre independent suppliers

2) The claims of poor reliability are certainly not my experience nor that of the eight other satisfied Spectrum owners I regularly compare notes with.

3) The software available is at least as good as for any home micro (and usually at a more competitive price) Indeed, I am typing this letter on my recently acquired *Tasword 2* program — a major step forward in my computer's usefulness — to display on the screen and print on a full size printer 64 columns per line with full word-processing capabilities

4) Lastly, and perhaps most importantly, it is probably almost entirely due to the business expertise of Sinclair Research that there is such fierce competition in the field of home micros, resulting in the abrupt drop in prices when they entered the field With the recent announcement of the QL, I should imagine that the business micro producers have begun to fear its possible effect on their profits

The only appreciable shortcoming in my Spectrum system is the lack of rapid mass storage I obviously intend ordering my Interface 1 and Microdrive when given the opportunity, but am becoming increasingly tempted at the gradually dropping prices of conventional 5" disc drives Unfortunately, the only way of knowing whether the Sinclair microfloppies are reliable or not appears to be by owning one

I should imagine a great many of your readers would be as interested as I to hear from new Microdrive owners of their experiences

Paul Douglas
26 Lauderdale Road
Hunton Bridge
King's Langley
Hertfordshire

"It's clear, Jenkins that you know more about computers than you do about Shakespeare

Joystick control

The following program line can be used to position a joystick controlled object on the screen when the rate of motion must be slowed so that Basic can keep up:

```
x=x+c3*sgn(int((joystk(n)*c1+c2-x)/c3))
```

where *x* is the co-ordinate of the shape
c1 and c2 determine the range of movement
c3 determines the rate of movement

When the joystick is moved, the shape moves at a constant rate towards the position determined by the joystick and then stops The integer function prevents overshoot

In tests, this line executes faster than similar solutions which turn the joystick into a simple left-right control and require boundary checking while retaining the advantage of analogue control

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Leics LE11 3UQ

Spot the Ball

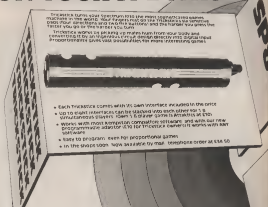
Every week I read your *Computer Swap columns* with a strange fascination It's as good as *Spot the Ball* In the 23 February issue, for example, I found a Jupiter Ace and an Acorn Atom cleverly secreted under the heading *Dragons for Sale* a BBC B under *Tandys*, and under ZX81s — a particularly rich vein six Vics a TI99/4a, a couple of Lynx items, another Tandy and some mysteriously irrelevant photographic stuff whose owner wanted to swap for anything *except* a ZX81

If these weird anomalies in the small-ad columns are in fact a secret means of transmitting information to the KGB I think we should be told

David Langford
Berkshire

The spot the Ball analogy is, unfortunately, quite accurate. A few Computer Swap advertisements always seem to end up under the wrong headings. But the number is falling.

GET THE RIGHT ANGLE ON YOUR SPECTRUM



TRICKSTICK-
The revolution that Runs Rings round ordinary joysticks

Showdown

A new game for 48K Spectrum by Andrew McCabe

The object of this game is to shoot your opponent three times preferably without getting shot yourself The two outlaws on screen both have five bullets so you will have to conserve your ammunition

The outlaws can be moved up and down the screen as can their guns It is also possible to guide the bullets after they have been fired Other features include falling tombstones, cacti and wagons which absorb bullets

Notes

Line 10 calls the subroutine which sets up the UDG s (*9000 onwards)

*20-40 are concerned with initialising the variables (13,2 strings which contain the different positions of each cowpokes gun)

*50-110 set up the display excluding the cowpokes and wagon

*120 checks to see if the second cactus has been printed and if not, the values of P&Q are altered (and thus the position of the second cactus (both P&Q are utilised later to save memory space))

150 prompts the player that the program is ready and waits for any key to be pressed before starting the main loop

Sometimes a line can be put in which bypasses the scanning of the keyboard if no key is pressed However in this program 90% of the main loop is concerned with keyboard scanning so this would save little if any time

The main loop starts at *200 & terminates at *905

*200&210 scan the keyboard (using IN so any combination of keys can be pressed at once) to see if the left cowpoke s movement keys have been depressed if so then this position is altered between the parameters of 1&20 and a space is printed either above or below him

*220&230 scan the keyboard to see if the left cowpoke s gun aiming keys have been depressed If so then W (and thus the part of A string sliced and the direction of the next bullet if fired) are altered

*250 prints the left cowpoke in its new position along with the part of A string containing the correct position of his gun

*300-350 are in effect the same as *200-290 but for the right cowpoke

*400&500 check to see if a cowpoke has fired a bullet — if so then the values of p & j (depending on which cowpoke fired) are set to the position of his gun (ie greater than nought)

*600&700 check to see if a bullet is in the air If so, then the subroutine pertaining to the flight of that bullet is called

*710 checks to see if h is greater than 18 If so then h is set as a random number bewteen 16&10

*800 sees if h =77 and if so sets it to 15

*800 sees if h is smaller than 19 (ie checks if the wagon is being displayed) and if so calls the subroutine dealing with wagon-movement

*910 prints the wagon before decrementing h (ie moving the wagon up the screen) and returning to the main loop

The subroutine *1000-1120 deals with the left cowpoke s bullet It increments its horizontal position by 1 and its vertical position by w (−1 1 or 0) It then calls the routine dealing with the death of the right cowpoke if it scores a hit, or returns to the main loop if not.

The subroutine *2000-2120 is the same except it deals with the right cowpoke s bullet NB when a bullet is fired the bullet count of the then particular cowpoke is decreased

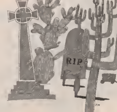
*4000-4160 deal with the death of the right cowpoke firstly they decrement a (ie the cowpoke rises in "boot hill") then a tombstone is laid wh le a warped version of the death march is played Finally the cowpoke s life count is decreased a check is made to see if he has lost 3 lives if so then the program jumps to the routine dealing with a victory for player if not then it jumps to line 150

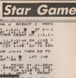
*5000-5160 are the same as the previous routine except that they deal with the death of player 1

The rating is calculated by how many lives the victor lost and how long he took to defeat his opponent. This is done using the variable t which is incremented every time the main loop is encounted 30 is then added to t for every life and by the victory Finally this number is divided by 100 Using this final number an area between the start and finish of the list of famous cowboys is printed over

Variables

A	RIGHT COWPOKE'S POSITION
C	BULLET COUNT OF LEFT COWPOKE
D	BULLET COUNT OF RIGHT COWPOKE
F	ONLY IN INITIALISING OF U D G s
G	ONLY IN INITIALISING OF U D G.s
H	WAGON POSITION (IF WAGON IS VISIBLE)
I	ONLY IN INITIALISING U D G.s
J	VERTICAL POS OF RIGHT COWPOKE'S BULLET
K	HORIZONTAL POS OF RIGHT COWPOKE S BULLET
L	LEFT COWPOKE'S LIFE COUNT
M	RIGHT COWPOKE S LIFE COUNT
P(*110)	VERTICAL POS OF CACTUS
P(later)	VERTICAL POS OF LEFT COWPOKE'S BULLET
Q(*110)	HORIZONTAL POS OF CACTUS
Q(later)	HORIZONTAL POS OF LEFT COWPOKE S BULLET
T	NUMBER OF TIMES MAIN LOOP HAS OCCURRED
W	DIRECTION OF LEFT COWPOKE S GUN
Z	DIRECTION OF RIGHT COWPOKE S GUN
Y (LOOP)	PART OF A BEEP STATEMENT EXECUTED WHEN A COWPOKE IS KILLED
F(LOOP	POS OF FALLING TOMBSTONE
A string	CONTAINS THE 3 / POSITIONS OF THE LEFT COWPOKE S GUN
B string	CONTAINS THE 3 POSITIONS OF THE RIGHT COWPOKE'S GUN
Z string	CONTAINS THE NAMES OF 5 FAMOUS OUTLAWS





```
1 PRINT "SHOWDOWN" ""
2 LET u=0
3 PRINT "PLAYER 1 up-1 down-gun up-3 gun down-4 fire 5 I 0 " "PLAYER 2 up-0 down-8 gun up-6 gun down-5 fire 9 TO 6 Each wagon has 5 bullits" "Bullits can be guided after firing. "If guided they have 50% accuracy "If out of ammo fire,go over red bullit and fire again "When wagon reaches top watch for falling tombstones.
4 LET h=0
5 PRINT "PRESS ANY KEY"
6 IF INKEY$="" THEN GO TO 6
8 BORDER 0
9 PAPER 6
10 GO TO 8000
11 CLS
20 LET x=18: LET a=3: LET w=0: LET z=0: LET c=0: LET d=5: LET l=3: LET e=3
30 LET a$="" LET b$=""
40 LET p=3: LET q=23: LET j=0: LET c=0
50 PRINT AT 21,0; INK 5; PAPER 0;
100 PRINT AT 0,0; INK 0; PAPER 0;"PLAYER 1      PLAYER 2"
110 PRINT AT p,q; INK 4; PAPER 6;"";AT p+1,q;"";AT p+2,q;"";AT p+3,q;""
120 IF p>10 THEN LET p=0: LET q=0: GO TO 150
130 LET p=p+1: LET q=q-2: GO TO 110
150 PRINT AT 20,12; INK 0;"READY?": IF INKEY$="" THEN GO TO 150
160 PRINT AT 20,12; INK 7;"DRAW!!"
170 BEEP 1,20: PRINT AT 20,12;"
200 IF IN 63486=254 OR IN 63486=252 THEN IF x>1 THEN LET x=x-1: PRINT AT x+2,0; INK 0;" ";AT x+1,1; INK 0;
210 IF IN 64510=254 OR IN 64510=252 THEN IF x<18 THEN LET x=x+1: PRINT AT x-1,0; INK 0;
220 IF IN 63486<253 AND w<1 THEN LET w=w+1
230 IF IN 64510<254 AND w>-1 THEN LET w=w-1
300 PRINT AT x+1,0; INK 0;"";AT x,0;a$(a+2)
305 IF IN 61438=254 OR IN 61438=252 THEN IF a>1 THEN LET a=a-1: PRINT AT a+2,31; INK 0;" ";AT a+1,30; INK 0;
310 IF IN 57342=253 OR IN 57342=249 THEN IF a<18 THEN LET a=a+1: PRINT AT a-1,30; INK 0;" "
320 IF IN 61438<254 AND z>-1 THEN LET z=z-1
330 IF IN 57342<253 AND z<1 THEN LET z=z+1
350 PRINT AT a+1,31; INK 0;"";AT a,30;b$(z+2)
400 IF IN 65022<>255 AND e=0 AND c>0 THEN LET e=x: PRINT AT 21,8+c;"": LET c=c-1: BEEP .1,10: PRINT AT 21,8+c; INK 0;
500 IF IN 49150<>255 AND j=0 AND d>0 THEN LET j=a: LET d=d-1: BEEP .1,10: LET k=30: PRINT AT 21,20+d;
510 IF IN 49150<>255 AND d=0 THEN PRINT AT 11,30; INK 2;"": IF a=11 THEN LET d=5: BEEP .1,20
520 IF IN 65022<>255 AND c=0 THEN PRINT AT 11,0; INK 2;"": IF x=11 THEN LET c=5: BEEP .1,20
550 LET v=v+1
600 IF e>0 THEN GO SUB 1000
700 IF j>0 THEN GO SUB 2000
710 IF h<2 OR h>15 THEN LET h=15*INT (RND*8)
800 IF h=17 THEN LET h=15: BEEP .1,60: BEEP .1,0
900 IF h>16 THEN GO TO 910
905 GO TO 200
910 PRINT AT h,14; INK 0;"";AT h+1,14; INK 4;"";AT h+2,14; INK 4;"";AT h+3,14; INK 0;""
920 LET h=h-.6
930 IF h<2 THEN GO TO 940
940 GO TO 200
942 INK 0: PRINT AT h,14;"";AT h+1,14;"";AT h+2,14;"";AT h+3,14;"": LET h=0
945 FOR y=1 TO 5: PRINT AT y,0; INK 3;"";AT y,31; INK 3;"": BEEP .01,60
946 IF y=x THEN GO TO 5000
947 IF y=a THEN GO TO 4000
948 PRINT AT y,0;"";AT y,31;"": NEXT y
950 GO TO 200
1000 IF q=30 THEN GO TO 1100
1005 LET p=p-w/2: LET q=q+1: PRINT AT p,q; INK 2; BRIGHT 1; PAPER 6;""
1006 PRINT AT p,q-1;"": IF w=1 THEN PRINT AT p+1,q-1;""
1007 IF w=-1 THEN PRINT AT p-1,q-1;""
1010 IF ATTR (p,q+1)=4 OR p>18 OR p<2 THEN PRINT AT p,q;"": LET p=0: LET q=0: GO TO 700
1030 RETURN
1100 PRINT AT p,q; INK 0;" "
1110 IF p=a OR p=a+1 THEN GO TO 4000
1115 LET p=0: LET q=0: BEEP .05,0
1120 RETURN
2000 IF k=0 THEN GO TO 2100
2005 LET j=j+z/2: LET k=k-1: PRINT AT j,k; INK 2; BRIGHT 1; PAPER 6;""
2006 PRINT AT j,k+1;"": IF z=-1 THEN PRINT AT j+1,k+1;""
2007 IF z=1 THEN PRINT AT j-1,k+1;""
2010 IF ATTR (j,k-1)=4 OR j>18 OR j<2 THEN PRINT AT j,k; INK 0;"": LET j=0: LET k=30: GO TO 800
2030 RETURN
2100 IF j=x OR j=x+1 THEN GO TO 5000
2105 PRINT AT j,1;"": LET j=0: LET k=30: BEEP .05,0
2108 RETURN
4000 LET a=a-1: PRINT AT 21,20+d; INK 7;"": PRINT AT a,19; INK 2;"AH!GOT ME!": FOR y=10 TO 1 STEP -1: BEEP .1,y: NEXT y: PRINT AT a,19;""
4010 LET a=a-1: PRINT AT a,29; INK 7;"";AT a+1,29; INK 0;""
4015 PAUSE 5
4030 IF a>1 THEN GO TO 4010
4040 PRINT AT 1,29; INK 7; PAPER 6;""
4050 BEEP .3,0: BEEP .3,2: BEEP .1,2: BEEP .3,0: BEEP .3,4: BEEP .1,3: BEEP .3,3: BEEP .2,2: BEEP .3,2: BEEP 2,1: BEEP .4,2
4070 PRINT AT 1,29;"";AT 2,29;""
4100 PRINT AT x,0;"";AT x+1,0;""
4110 LET a=5: LET c=5: LET x=18: LET a=18
4120 LET p=0: LET q=0
4130 PRINT AT 21,5; INK 3; PAPER 0;
4150 IF u=0 THEN GO TO 4500
4160 GO TO 100
4500 PRINT AT 10,10; INK 0; PAPER 3; FLASH 1;"YOU WIN PLAYER 1"
4502 LET v=u+00*(3-e)
4505 BEEP .3,0: BEEP .1,0: BEEP .1,5: BEEP .3,0: BEEP .2,5: BEEP .2,7: BEEP .1,0
4510 GO TO 8500
5000 LET l=l-1: PRINT AT 21,1; INK 7;"": PRINT AT x,4; INK 2;"I'M A GONNER!": FOR y=10 TO 1 STEP -1: BEEP .1,y: NEXT y: PRINT AT x,4;""
5010 LET x=x-1: PRINT AT x,0; INK 7;"";AT x+1,0; INK 0;"";AT x+2,0;""
5015 PAUSE 5
5030 IF x>1 THEN GO TO 5010
5040 PRINT AT 1,0; INK 7; PAPER 6;""
5050 BEEP .3,0: BEEP .3,2: BEEP .1,2: BEEP .3,2: BEEP .3,4: BEEP .1,3: BEEP .3,3: BEEP .2,2: BEEP .3,2: BEEP .2,1: BEEP .4,2
5070 PRINT AT 1,0;"";""
5100 PRINT AT a,29;"";AT a+1,29;""
5110 LET d=5: LET c=5: LET x=18: LET a=18
5120 PRINT AT 21,20+a; INK 7;" "
5130 PRINT AT 21,5; INK 5; PAPER 0;
5155 IF l=0 THEN GO TO 5500
5160 GO TO 150
5500 PRINT AT 10,10; INK 0; PAPER 3; FLASH 1;"YOU WIN PLAYER 2"
5502 LET v=u+00*(3-l)
5505 BEEP .3,0: BEEP .1,5: BEEP .1,5: BEEP .2,0: BEEP .2,5: BEEP .2,7: BEEP .1,0
5510 IF INKEY$="" THEN GO TO 5510
8012 LET z$="      BUTCH BOOHOOOOC BILLY JESSIE"
8015 FOR y=0 TO 5: PRINT AT 14+y,10; INK 7; PAPER 0;"";AT 14+y,12; INK 3;z$(y*8)+1 TO (y*8)+8): NEXT y
8018 LET v=INT (u/100): PRINT AT 13+v,12; PAPER 7; OVER 1;""
8019 IF INKEY$="" THEN GO TO 8019
8500 FOR y=1 TO 10: BEEP .1,y: NEXT y: GO TO 11
9000 FOR f=0 TO 17: FOR g=0 TO 7: READ i: POKE USR CHR$ (144+f)+g,i: NEXT g: NEXT f
9100 DATA 0,120,0,120,192,224,112,24
9110 DATA 0,100,0,30,252,224,100,0
9120 DATA 0,100,40,96,224,100,32,0
9130 DATA 0,28,12,6,7,2,1,0
9140 DATA 0,1,6,4,31,7,1,0
9150 DATA 0,1,0,1,3,7,12,24
9160 DATA 0,31,6,6,18,18,18,18
9172 DATA 00,240,96,96,240,240,240,240
9180 DATA 0,24,24,24,24,60,120,130
9190 DATA 64,60,60,160,255,255,255,255
9200 DATA 255,255,255,255,127,63,63,15
9210 DATA 255,255,252,252,224,240,252,240
9220 DATA 15,0,14,12,12,12,14,15
9230 DATA 140,60,112,48,48,48,112,240
9240 DATA 0,48,252,48,48,00,63,03
9250 DATA 24,24,255,255,24,24,24,24
9260 DATA 224,224,224,255,255,255,255,224
9270 DATA 7,7,7,255,255,255,255,7
9300 GO TO 11
```

Chip off the old block

***David Kelly** talks to Barry Waite, Vice President of Motorola's European semiconductor division*

The microprocessor chip chosen as the heart of Sinclair's QL computer is the 68008 manufactured by Motorola.

Motorola is one of the world's biggest chip manufacturers, employing over 80 000 people in various parts of the globe and with revenue last year of $4 3bn

The 68008 chips for the QL will eventually be produced at Motorola's plant in East Kilbride Scotland The factory currently employs around 1 600 people but that number will soon go up Over £65m has been invested in the site in the last two years to build what will become Europe's first computer chip fabrication and assembly facility From next year East Kilbride will be taking delivery of raw silicon and turning it into 68008 chips for the QL.

With the 68000-series of chips — the 68008 68000 and 68020 (the later planned for the end of this year) — Motorola has what it claims is the only fully upward compatible 8—16—32-bit processor set What this mouthful means is that its chips all share the same 32 bit internal design with a choice of external connections The 68008 has an 8-bit data bus The 68000 (used in the Apple Lisa and Macintosh, the Hewlett Packard HP200 and the Tandy Model 16) has a 16 bit data bus And the 68020 will have the full 32-bit bus

"We told Sinclair we thought we had a good chip and he agreed with us," says Barry Waite the man in charge of Motorola's Scottish plant

The 68008 chip magnified 8½ times

The 68008 offers several advantages for Sinclair over its larger 68000 relative It is cheaper — a typical cost to a manufacturer, taking the 68008 in reasonable quantities, would be considerably less than £20 each The chip occupies one-third of the space of the 68000 on the printed-circuit board

And perhaps he most significant advantage is that with only 48-pins compared with 69 on the 68000, it requires a smaller minimum circuit to build a micro

"Personal computers are very much an 8-bit world," says Barry Waite "You are dealing all the time with character strings and keyboard inputs The 68000 can fetch 16-bit data faster, but you need a bigger minimum system to run it. The 68008 on the QL keeps the chip-count down"

The 68008 is completely software compatible with the other processors in the series — object code for the 68008 will run on all the other chips right up to the 68020 with no recompiling and no rewriting

"We worked closely with Sinclair from the start and we supplied them with development systems Clive only started the project 14 months ago and to go so far so quickly I think it helped that we are here in UK."

First samples of the 68008 chip were produced in mid 1982 and volume production began in the winter last year

Eighteen months may seem a long time to take from first test samples to full production of a new chip but then a microprocessor is rather more complex than a grain of sand The 68008 manages to cram the equivalent of 70 000 transistors onto a sliver of silicon only 7mm x 6mm

A transistor works by putting in contact two pieces of semiconductor material (silicon in most cases) each with a different electrical characteristic Conduction across the two halves (called a semiconductor junction) is determined by the voltage at which the junction is working Small variations in the voltage cause very big changes to the current flowing across the junction And so the device can be used as an amplifier or a switch — using a small voltage to control a much larger current

The two halves of the semiconductor junction are both made of very pure silicon, the electrical characteristics of which are changed by adding very precisely determined amounts of impurity elements such as arsenic boron and phosporus

Manufacture of a 68008 begins with the raw silicon in the form of a single crystal over six inches in diameter and maybe two feet long In much the same way as you can make big copper sulphate crystals using a seed crystal suspended in a solution of copper sulphate, a small silicon crystal is used to draw the larger one from an extremely pure (only one or two parts per million impurities) vat of molten silicon Once the crystal has cooled it is sliced into discs less than 1mm thick.

First, the impurity gases — boron, arsenic or phosphorus — are diffused into the silicon to create the basic transistor junction Then selected areas of the disc are etched away with acid isolating each of the 70,000 transistors as a small island The widths of the tracks between these islands are very fine — of the order of two or three ten-thousandths of a centimetre

Barry Waite holds a crystal of raw silicon

To achieve that level of accuracy, a photoresistive etch is used The silicon is coated with a special substance which is resistant to etching when exposed to light A photographic method projects a minute image of the chip design onto the resistive coating When etched, only the areas exposed to light remain

Next, a layer of metal is evaporated onto the surface of the silicon wafer and selectively etched away again making all the necessary connections between the thousands of semiconductor islands

Many hundreds of these chips — or dies — are manufactured simultaneously on each slice of silicon Each die is then checked and the proportion that are good are cut out using a diamond saw or laser

Gold wires are then bonded onto the die to make the connections from the silicon wafer to the pins on the final chip and then the whole device is encapsulated in the ceramic package you buy

East Kilbride is now set to become the first European 6inch wafer fabrication plant early next year Chip fabrication requires stringent environmental control The new £65m facility has had to be custom designed so that the working area — about the size of a football pitch — is completely vibration-free

The floor has been built down directly onto the bed-rock while the roof and walls are kept separate and all service ducting has had to be supported on springs to damp out vibration

The air in the plant will be cleaned so that it contains less than 10 parts per million of dust particles per cubic foot of air And the air will have to be circulated at the rate of around 3 million cubic feet a minute

By December this year, Motorola hopes it will be running the first silicon test wafers through the new plant and it is proposed to start full production in 1985

"To give you some idea of the scale," says Barry Waite "Motorola is currently producing 10 million devices each week

"That begins to put the Sinclair thing into perspective"

Play it again, Sam

***Jeff Naylor** looks at the Yamaha Y1S503 micro and the use it makes of MSX Basic*

If you were an electronics manufacturer belatedly moving into home computers how would you sell your product in the face of the well established market leaders? However advanced or cheap your product the one thing lacking would be the impressive base of software that is available for the computers that dominate sales

This is a classic case of "the chicken or the egg", because few good software houses are willing to plough effort into products that have small potential, but computers with little decent software available have difficulty in carving out a reasonable share of the market You, as the manufacturer can commission programs or even produce them in house but it would be expensive to rival the shelves of Commodore Atari and in Britain Sinclair software As for making a home computer look-alike which has been done for the IBM PC, the profit margins probably can't finance the legal fees that would ensue from making a CBM 64 copy and waiting for the writs to arrive

One possible solution to this problem has emerged in the shape of MSX Fourteen Japanese electronics firms and Spectravideo have combined to produce a machine format that will allow them to share a common base of software The Basic is provided by Microsoft (MSX stands for Microsoft extended) The hardware configuration includes a Z80 processer a 9918 video controller and a 8912 sound generator

The Yamaha YIS503 fits the bill in terms of software compatibility, but has the added feature of hosting an optional music synthesiser — for each machine to sell in preference to any other variations need to be promoted by the manufacturers Prices have not been settled but it is thought that the 503 will cost around £200, with the synthesiser option adding another £100

The review machine is attractive to look at and handle — clothed in shades of grey plastic it is fairly substantial in both weight and size At the back are various input and output sockets including monitor and printer ports and an expansion bus which consists of the edge of the main PCB exposed through a slot The left side of the computer hosts two joystick connectors (Atari style of course) the right has a power switch and large cavernous space to take the music module A Rom socket lurks under a sprung door at the top back righthand corner the entrance is guarded by a microswitch that interrupts the power when a cartridge is inserted

Delving inside the case reveals that the main PCB is divided into two areas the power supply is back left with space in front for the synth module while the micro circuitry itself is shielded under a metal screen In addition a vertically mounted board contains the video circuits so that catering for different TV standards (ie British) will not involve changing the main board The circuitry is well constructed and labelled, parts are not only numbered but also named with part numbers, right down to the humblest TTL chip

The main components are those of an MSX computer — a Z80A microprocesser is at the heart of the system and in support are a parallel interface chip (8255) a video display processer (9928A compatible with the specified 9918A), a programmable sound generator (AY-3 8912) and what I presume to be a custom logic chip The systems Rom is one massive 23256P storing 256K bits, 32K bytes of operating system and Basic interpreter The Ram is divided into two areas 16K for the screen display and a further 48K for the computer As all this memory adds up to much more than can be addressed by the 64K address bus of the Z80 and as the Yamaha can also host large amounts of plug in Rom software some kind of bank switching is obviously required

The start of the memory space (*000H to 7FFFh*) is normally occupied by Rom while from *8000h* to *FC80H* is available for Basic programs and variables Above this, system variables and also some system software are held in Ram, so extending the Basic even further is no doubt possible The machine also has a well organised input-output port map Only eight bit addresses are implemented, so there are potentially 256 ports The support chips are addressed through I/O channels

It is worth noting that the MSX format does not require 32K of Ram If the minimum of 16K is provided then Basic programs start at *C000h* and there is a 16K "hole" in the memory map from *8000h* to *BFFFh*

First impressions of computers are strongly influenced by the quality of the keyboard and in this area the Yamaha scores highly An electronic typewriter would not be too ashamed of the keys layout and travel even though a membrane hides beneath the key mechanisms to perform the switching In addition to a full Qwerty layout and space bar there is a double size return key an illuminated Caps lock key and various control keys

The keyboard was very responsive — it seems that the keyboard scan can store up to 40 characters in a buffer for future attention There is also an autorepeat function Top left of the keyboard are five function keys and these can be shifted to give 10 separate user defined keys

Precisely what each key does can be altered by the programmer with ease from switch on the keys are designated as *Color Auto Goto List* and *Run* in the unshifted mode and *Color 15 4, 7* (resetting the default values) *Cload", Continue List* (a period standing for the current line number) and *Run* (performing a *CLS* first) when shifted

The bottom line of the screen reflects what each key is currently programmed to do, although this helpful aid can be disabled with the command *Key Off* Reprogramming the keys is only a matter of using a Basic statement. For example, *Key (1) "Print Fre (0)" +Chrs 13)* will program key 1 to print the amount of free memory space left I found the function keys a great help whilst writing and debugging programs by tailoring them to changing requirements

All MSX machines are equipped with separate cursor keys because they are used in the editing of programs — the four arrow keys are placed to the right of the main keyboard When I first saw the name 'Microsoft' on the literature accompanying the machine, I instantly thought of struggling with a line editor similar to that of the Dragon but to my intense relief I found that MSX Basic is equipped with an on-screen editor which is a joy to use

In order to edit a program you list the area you wish to alter and then whizz about the cursor keys making the changes at the cursor by either overtyping or using the delete and insert keys In addition you can re-enter a complex direct command, so if you are using the computer as a calculator and enter a syntax error all is not lost Very nice indeed and I take back all I muttered

about Microsoft when programming my Dragon

Well what about the Basic itself? I found the MSX programming guide about as much use as most of the poorer computer manuals but then it was in Japanese! When translated it will probably be very good — the many illustrations were helpful

However I must be thankful for an English MSX Basic specification — the syntax of some commands is not always obvious The interpreter is as extensive as you would expect from a computer with 32K of Rom although BBC fans may not agree MSX makes few concessions to structured programming — putting *Goto* on a function key will not enhance the Yamaha s reputation in that respect!

Multi-statement lines, an optional *Let* statement *Auto* line numbering *Renumber If then else* and user defined functions are all included as should be expected, but there were also many pleasant surprises and no noticeable omissions

The standard accuracy of the arithmetic is 14 digits but you can also work with single precision (six digits) or integers to save time and memory There is a useful sounding integer division function and I was pleased to see 16-bit signed logical operators for working in binary masking off parts of numbers and other exotic processes normally cumbersome in Basic The operators are *Not And Or Xor, Equ* and *Imp Swap* will exchange the values of two variables You may work in hexadecimal octal or binary with the functions *Hex$ Oct$* and *Bins$* while the memory address of a variable is given by *Varptr*

Perhaps the most interesting features are the trapping functions available not only is there *On Error On Interval* and *On Key Gosub* (trapping the function keys) but also *On Strig* which reacts to the joystick fire buttons and *On Sprite* which detects sprite collisions — good news for games programmers About the only obvious criticism I can make is that in common with earlier Microsoft Basics, variable names are only significant to two letters

The Yamaha can use an ordinary audio cassette recorder for data and program storage, so there is no expensive dedicated digital recorder to buy You can use tape to save machine code and for file handling

The interface works well and is dual speed at 1200 baud it is as fast as the Spectrum while 2400 baud sacrifices some reliability for very quick operation Setting the right replay level is not too difficult although there is no visual indication, as provided by the Spectrum s striped border

Graphics on the MSX system hinge on the capabilities of the 9918 video chip also contained in the Sord M5 and Memotech computers However the Basic allows you to exploit the graphics easily The Yamaha has a palette of 15 colours, plus transparent" — the colours are the primaries (red, green and blue), their complements (cyan, magenta and yellow), black and white

There are four screen modes Screen 0 is a 40 by 24 text screen that can only contain two of the colours at any time Screen 1 only boasts 32 by 24 characters, has a separate border colour and can support sprites — investigations revealed that you can use more than two colours, but the colour boundaries ovattes the characters shapes

Both of the text screens, by default have reduced widths Screen 0 is only 39 columns wide screen 1 just 29 but you can reset these from Basic In fact the display given was of a very odd aspect ratio (I used a 50 HZ monitor to display the picture) and in the 32 column mode printing to column 0 produced a character completely in cut-off so the *Width* command masked a poorly generated display Until a UK version actually appears, judgment on this point must wait

Screens 2 and 3 are graphics only, mode 2 gives a pixel resolution of 256 by 192 but the colour resolution is limited to one attribute defining paper and ink colour for each eight horizontal pixels on the screen Mode 3 divides the screen into blocks of four by four pixels and allows these blocks to assume any colour

Investigating how the various screens are mapped was quite illuminating All the modes employ a name table that holds the number of the character shape which is also held in Vram — modes 1 and 2 also have colour tables This gives the best of both worlds as you can access the bit map. or change 64 pixels of the screen with one *Vpoke*

Draw is a Basic command that allows a set of subodmmands to be used For example, *Draw U10L5"* will draw up 10 units then left five units from the current cursor position *Draw* also has a *Scale* subcommand as well as *Angle*

The star of the graphics is undoubtedly the hardware generated sprite system — 256 eight by eight or 64 sixteen by sixteen shapes can be moved about one pixel at a time on 32 different planes In contrast to other computers Basic fully supports these sprites, and they work in modes 1 2 and 3

Sound on the Yamaha comes from the well tested 8912 chip It has three tone sources, a noise channel and various envelopes The effects possible are quite impressive

Play allows strings of music subcommands to be sent to the chip for the attention of each tone channel This ' macro language" recognizes musical notation and the suocdmmands include *Temp* and *Envelope Sound* allows you to write directly to the chip s registers There is no internal speaker to corrupt your melodies as the sound emanates from the TV speaker

The keyboard produces a software click on the sound channel but this can be switched off The keyboard matrix is very easy to read either from machine code or Basic as it is I/O mapped via the PPI chip This chip also controls some memory bank switching operations in particular those for the plug-in Rom cartridges

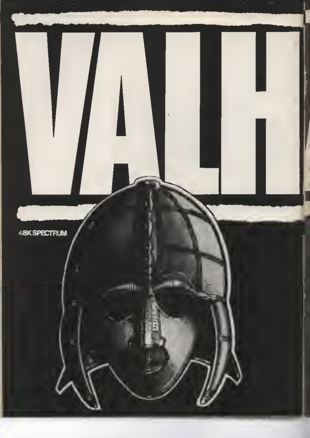
I only had the Yamaha for a few days but while investigating it I could not help being distracted by the synthesiser which plugged in the side The module is equipped with a *Midi* interface and audio output The keyboard has three and a half octaves, the keys being smaller in pitch than a piano There are two voices one of which is polyphonic and these have a good number of alternative sounds the more percussive ones being very realistic indeed

The whole thing is controlled from the computer which gives a visual display of the current set-up You can also record a tune in memory, then play along with it

My overall impression of the Yamaha 503 is of a computer that is a delight to use If it only syntax checked lines of Basic when they were entered, then it would be getting close to ideal As for the MSX format although not brilliant it is more than adequate and will fulfil the expectations of most purchasers

As for compatibility, one thing that worried me was a note in the language specification relating to *Out* and *Inp* which implied that programmers could not rely on port addresses being compatible with later machines Yes all MSX machines are compatible but no, you can't write in machine code and expect it to work. I suppose you can always interrogate the host machine s Rom to see where its graphic chip is but it seems a shame that you need to

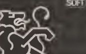
Anyway thank you Yamaha particularly for the use of your synthesiser — I m off now to buy a Depeche Mode album

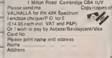

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Centre of operations

***Alan McDonald** takes a further look at the Z80 and 6502 processors*

The *A*-register is the only 8 bit register which can perform arithmetic operation This is true for both the Z80 and 6502 processors Both these processors can only add and subtract numbers There are no multiply and divide instructions

There are two types of add instructions on the Z80 and they are *ADD* and *ADC* There is quite a lot you can do with the *ADD* instruction, eg

```
ADD A,8 bit register
ADD A,8 bit number
ADD A,(HL)
ADD A,(IX+displacement)
ADD A,(IY+displacement)
```

These instructions are pretty straight forward For example lets suppose *A* holds the number 10, then *ADD A 20* would make *A=30*

But there is one thing you cannot do with the *ADD* instruction and that is to *ADD A*, (16 bit address) Instead, you will have to do the following

```
LD HL,16 bit address
ADD A,(HL)
```

If the resulting arithmetic operation is greater than 255, then strange things can start to happen ie different values are left in the *A* register than you might expect. This is caused by arithmetic overflow

The *ADC* command takes into account the possibility of overflow and changes the carry flag accordingly The *ADC* instruction operates in the same range as *ADD*

```
ADC A,8 bit register
ADC A,8 bit number
ADC A,(HL)
ADC A,(IX+displacement)
ADC A,(IY+displacement)
```

The *SUB* and *SBC* (subtract) instructions operate over the same range of instructions as the *ADD* and *ADC* commands

16 bit arithmetic

Sixteen bit arithmetic takes place in either the *HL* register pair, or in the index registers (*IX* and *IY*) There is no *SUB* command for 16 bit arithmetic — only *SBC* (subtract with carry) is supported Addition is simple and the following commands are allowed

```
ADD HL,register pair
ADC HL,register pair
ADD HL,SP
ADC HL,SP
ADD IX register pair except HL
ADD IY register pair except HL
ADD IX,IX
ADD IY,IY
ADD IX,SP
ADD IY,SP
```

Subtraction with carry (*SBC*) operates as follows

```
SBC HL,any register pair
SBC HL,SP
```

Arithmetic on the 6502 is limited to the *A* register Since there are no 16 bit registers on the 6502 (except for the program counter) arithmetic is limited to 8 bits There is a further limitation on the 6502 — and *ADD* and *SUB* commands found on the Z80 do not exist Instead we are limited to *ADC* and *SBC* (addition and subtraction with carry) Therefore, before performing any arithmetic operations you should first clear the carry flag Before doing subtraction, you should set the carry flag, eg

```
CLC = clear the carry flag
SEC = set the carry flag
```

While looking at the carry flag it is worth listing the commands to change some of the other flags.

```
CLD = clear the decimal flag
CLI = clear the interrupt flag
CLV = clear the over flow flag
SED = set the decimal flag
SEI = set the interrupt flag
```

The following instructions are the ones used to perform addition

```
ADC # &90 Add the value in A with &90 and store the
          result in A
Page 0 ADC &90
       ADC &90 X ←displacement held in the X
       register
```

The previous instructions at English read 'Add the value held in *A* with that held at memory location *&90* and store the result in *A*. The following instructions require a 16 bit address

```
ADC &9000
ADC &9000 X
ADC &9000 Y
```

These instructions work in exactly the same way as those used for page 0 The *SBC* instructions work in the same way as the *ADC* instructions, but for subtraction instead of addition

```
       SBC # &90
Page 0 SBC &90
       SBC &90 X
```

The following work with 16 bit addresses

```
SBC &9000
SBC &9000 X
SBC &9000 Y
```

Both the Z80 and 6502 processors allow numbers to be incremented and decremented As an example imagine the *A* register contained 10 — after an increment instruction, the number 10 becomes 11, ie, incremented by one After a decrement instruction the number 10 becomes 9, ie decremented by one

On the Z80 it is possible to increment registers, register pairs and numbers stored in memory locations The mnemonic to increment numbers on the Z80 is *INC*

```
INC 8 bit register
INC 16 bit register pair
INC IX
INC IY
INC (IX+displacement)
INC (IY+displacement)
INC (HL)
```

Note Do not get the instructions *INC HL* and *INC (HL)* confused The first (*INC HL*) acts on the 16 bit number stored in the *HL* register pair, eg, if *HL* was equal to 30000 then after an *INC HL* command *HL* would be equal to 30001 The second instruction (*INC (HL)*) increments the contents of the memory pointed to by the 16 bit address held in the *HL* register pair, eg HL = 30000

Address	Value held in address	
30000	0	before INC (HL)
30000	0	after INC (HL)

The *DEC* (decrement) instruction does the complete opposite of the increment instruction, ie, 1 is subtracted rather than added The *DEC* instruction operates over the following range

```
DEC 8 bit number
DEC 16 bit address
DEC IX
DEC IY
DEC (IX+displacement)
DEC (IY+displacement)
DEC (HL)
```

The 6502 allows registers (*X* and *Y*) and memory locations to be incremented and decremented There are three instructions on the 6502 which allow this — *INC*, *INX* and *INY* The *INC* instruction increments the number stored in the stated memory address, eg *INC &FFFF* increments the number stored at address *FFFF* (hex) If the number at address *FFFF* originally contained 10, it would now contain 11

The *INX* and *INY* instructions add one to the value held in the appropriate index register Here is an example

```
LDX # 46
INX                results in X becoming 47
```

The decrement instruction does the complete opposite of the *INC* instruction The following are all allowed

```
DEC 16 bit address
DEX
DEY
```

The Stack

A very common structure in programming is the stack Imagine you have four numbers 10,3,2 and 37 You can stack them up as follows

10 3 2, 37 stacked up becomes.

37
2
3
10

The first number typed in (10) would be placed at the bottom of the stack whereas the last number typed in (37) would be on top of the stack This sort of structure is known as the LIFO structure (Last In First Out)

The Z80 uses two instructions to add and remove data from the stack — *PUSH* and *POP* To add 7 to the stack you *PUSH* it on

Push	
	7
	37
	2
	3
	1Ø

When you remove a number, you *POP* it off

	7
37	Pop
2	
3	
1Ø	

You can *PUSH* data, etc, onto the stack using the following instructions

```
PUSH any register pair
PUSH IX
PUSH IY
```

And *POP* it off by using

```
POP any register pair
POP IX
POP IY
```

The stack can be very useful. For example, let's say we wanted to make the *BC* register pair equal to the *DE* register pair. We could do a short two line program

```
PUSH DE   push the number in DE onto the stack
POP BC    put the number into BC
```

The 6502 uses similar instructions to the Z80. To *PUSH* numbers onto the stack it uses *PUSH*. But, instead of using *POP* the 6502 uses *Pull* (it does exactly the same function as *POP* on the Z80)

There are only two instructions which allow numbers to be *Pushed* onto the stack on the 6502.

```
PHA  push the A register onto the stack
PHP  push the processor status register (Flag) onto
     the stack.
```

To pull numbers off, there are also two instructions

```
PLA  pull the number on top of the stack and put it into
     the A register
PLP  pull the number off of the top of the stack and
     store it in the processor status register
```

There is one limitation on the 6502. Notice how there are no *PHX PHY* to *Push* and *X* and *Y* registers onto the stack. And no *PLX* and *PLY* to *Pull* them off. Instead, you will have to resort to

```
TXA  transfer the contents from X into A
PHA  push the contents of A onto the stack
```

The same also follows for the *Y* register, ie, *TYA* followed by *PHA*

```
PLA  pull the number on top of the tack and store it in A
TAX  transfer the contents from A into X
```

Again, this refers to *Y* as well, ie, *PLA* followed by *TAY*

Logical Operations

I shall give a brief description on how the logical operations work. Remember (Ø = false 1 = true). *AND* the result is only true if both operands are true

```
1 AND Ø=Ø (false)
Ø AND Ø=Ø (false)
1 AND 1=1 (true)
Ø AND 1=Ø (false)
```

NOT If the operand is false then it becomes true and if it is true then it becomes false

```
Ø NOT =1
1 NOT =Ø
```

OR The result is true if either of the operands are true

```
1 OR Ø=1 (true)
Ø OR Ø=Ø (false)
1 OR 1=1 (true)
Ø OR 1=1 (true)
```

EOR or *XOR* (exclusive *OR*) The result is true if only one of the operands is true

```
1 EOR Ø=1 (true)
Ø EOR Ø=Ø (false)
1 EOR 1=Ø (false)
Ø EOR 1=1 (true)
```

The Z80 has three logical operations *AND, OR* and *XOR*. They cover the following range of instructions

```
AND 8 bit register
AND 8 bit number
AND (HL)
AND (IX+displacement)
AND (IY+displacement)
```

OR and *XOR* operate over the same range as the *AND* instruction. The *AND* instruction is very useful as it allows us to mask a byte. As an example, imagine you want to limit a number between Ø and 1Ø. You would use the instruction

```
AND 1Ø
```

Logical operations can only be carried out in the *A* register. Therefore, the previous example *AND*s the number 1Ø with that in the *A* register. If the *A* register contained 255 (11111111 in binary) then the instruction *AND* 1Ø would have the affect of

```
               ↓↓↓↓↓↓↓↓
  A register = 11111111
1Ø in binary = ØØØØ1Ø1Ø
               --------
after AND 1Ø   ØØØØ1Ø1Ø
```

Can you see how it works?

The *OR* function is also very useful as it allows you to set any bits in any number. The *XOR* function is also useful. As an example, see what happens when the *A* register is *XOR*ed with itself

```
A register =  1ØØ1Ø1ØØ  any number held in A
XOR A         1ØØ1Ø1ØØ  XOR A with A
the result is ØØØØØØØØ
```

The *A* register was cleared, ie set to Ø, as was the carry flag. In effect, it saves you from doing *LD A,Ø*. More importantly, it saves memory

The 6502 has the following logical functions *AND, OR* and *EOR* (exclusive *OR*). The 6502 can only perform logical operations in the *A* register (same as on the Z80). Here is an example

```
AND  8 bit number
```

This instruction *AND*'s the contents of the *A* register with the 8 bit number specified, and then stores the result in the *A* register

Here is a list of the remaining logical instructions:

```
Page Ø    AND $ØØ
          AND $ØØ X
16 bit addresses
          AND $ØØØØ
          AND $ØØØØ X
          AND $ØØØØ Y
```

The above instructions *AND*s *A* with the contents of the specified memory address, then stores the result in *A*. The *OR* and *EOR* functions operate over the same range as the *AND* instructions

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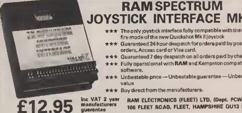
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A timely remark

***John Ingleson** explains how to program using Rem statements, without affecting the Run time*

The Rem statement is probably the single most useful device for simplifying the writing of programs It may be used to provide brief documentation within the program, perhaps the only documentation that many programmers use Names, dates, descriptions variables sub-routines and functions listed at the beginning of a program are some of the things that make life easier when called upon to modify or customise a program written some time ago (or even yesterday)

Labelling blocks of code, subroutines, data lists etc with short explanations is also an invaluable tool in making their use and logical structure apparent giving the writer clear reference points from which to work The highlighting of comments with blank Rem lines is perhaps a much neglected device that is useful for saving eyestrain in long program listings

However, the use of these techniques does have disadvantages The limits of memory may inhibit the use of detailed documentation There may simply not be enough room to write or Run the program despite or rather because of copious useful notes A program listing may easily consist of 25 per cent Rem statements If the program is relatively large — say over 30K than that can amount to a lot of unused bytes at 'Run time'

Where the constraints of memory size are not restrictive, the size of an often used program while *Saving* and *Loading* can prove tedious One other complaint that may be cited against the liberal use of Rem statements is that of the speed of program execution While the operating system "ignores" Rem statements it still takes a finite time to do this In the Spectrum every time a sub-routine or function is called the interpreter starts at the beginning of the program and searches through until the relevant code is found Thus, Rem statements especially those at the beginning (these usually being the bulkiest), are 'ignored many times during execution, significantly slowing down the speed at which the program Runs

Using the Spectrum (a machine not noted for its lightning fast speed in producing moving graphics in Basic) it would clearly be an advantage to do without any Rems However, it is almost unthinkable to write any programs without them

How to resolve this dilemma? We could write the program including all our Rems and then, when the program is debugged and Running to our requirements, simply delete all the Rems by typing in the line numbers and then *Enter* (keeping a copy of the complete program with Rems for future reference) This may seem a likely solution, until it is tried in practice Numb fingers, tired eyes and program lines that disappear without trace are some of the pitfalls

But isn t this one of those dull routine jobs we keep being told are the ideal tasks for a computer? Well, here is a short machine code program that will allow you to write as many Rems as you wish and then when your program is complete — to strike them at a stroke (Again — don t forget to *Save* a complete copy, Rems and all, for possible future reference, modification and customisation)

First, let's review the way a Basic line is held in memory (see diagram 1) The address of the start of the first line number is stored by the Spectrum Rom at address 23635 and 23636 This is the system variable *Prog* Similarly the address of the last byte of Basic program +1 is stored at address 23627 and 23628 (system variable *Vars*) Both pairs of bytes are stored as Low byte — High byte

The first two bytes of a line hold the line number — High byte first, then Low byte (the reverse of what we would normally expect) The next two bytes are held the length of the line (as we would expect — Low byte High byte) following that the actual code of the line ending with 13 (the Code for *Enter*) Then comes the next line number and so on

Briefly the routine works by checking the first piece of code in a line number to see if it is a Rem (code 234) If it isn t it goes to the next line number — if it is then the remaining code (from the next line number to the end of the program) is moved down memory over writing the Rem statement to be deleted The end marker of the program (system variable *Vars*) is then moved to its new position at the end of the revised program for referencing the end of the next block of program to be moved down The number of bytes deleted is then stored at the end of the printer buffer (for want of a less obtrusive location) The total is needed at the end of the routine

Diagram 1

```
ADRESS (HEX)
        RAM DATA (HEX)

5C4B F2  VARS  POINTS TO PROGRAM END + 1 (VARIABLES AREA)
5C4C 5C

5C53 CB  PROG  POINTS TO PROGRAM START
5C54 5C
                                          LISTING
5CCB ØØ  LINE NUMBER.................... 1Ø
5CCC ØA
5CCD ØB  NO. BYTES IN LINE
5CCE ØØ
5CCF F1  ............................... LET
5CDØ 61  ............................... a
5CD1 3D  ............................... =
5CD2 31  ............................... 1
5CD3 ØE  CHR$ 14 *
5CD4 ØØ
5CD5 ØØ
5CD6 Ø1  NUMBER 1 DEC.
5CD7 ØØ
5CD8 ØØ
5CD9 ØD  ENTER - NEW LINE
5CDA ØØ  LINE NUMBER.................... 2Ø
5CDB 14
5CDC Ø5  NO. BYTES IN LINE
5CDD ØØ
5CDE EA  ............................... REM
         REST OF PROGRAM
5CF1 ØD  LAST ENTER (END OF PROGRAM)
5CF2 8Ø  START OF VARIABLES AREA
```

Diag. 1 illustrates how a program is held in SPECTRUM BASIC.
* CHR$ 14 signifies [illegible] 5 byte format.

This process is repeated uhol the end of the program is detected, at which point a subroutine, held in the Spectrum Rom, is called This routine "tidies up' by reclaiming the redundant bytes — left between the end of the revised program and the end of the original one (echoes of the tail end of the original code that has been repeatedly rewritten down memory) This subroutine in Rom also calls another — *Pointers* which resets all the system pointers affected by the changes The code may be used as it is, to delete Rems after line numbers and also line numbers with a space following

A separate algorythm is needed if the last line is a Rem because if *BC* is loaded with zero then *BC* will be decremented to 65535 on the next cycle of *LDIR* As *BC* is the counter for *LDIR* then we will end up moving 65536 bytes instead of none In fact, we move the total number of bytes in the line from beyond *Vars* to uphold the logic of the subroutine *Move*, thereby seting *Vars* and *Stbyt* (the total of deleted bytes) correctly before *Returning* from the machine code program

If a machine code program is stored in a Rem statement or a critical Rem statement is to be kept in the program, then the line may be "protected" by inserting an inverse character (*Chrs 20 — Caps Shift 4*) immediately following the line number and before the Rem (remember to remove the inverse before using your machine code, as the position of code will have moved in memory)

Registers need not be saved by the routine, as the program is unlikely to be used as a subroutine of another program Modifications may be made to delete Rems that occur at the end of program lines

Hints — the whole program line will have to be checked for a colon then Rem (don t forget to exclude bytes that hold data which might occur in the combination of the code for a colon and then a Rem) When deleting a colon Rem a new algorithm will need to be developed to set *Vars*

NB Program lines will be treated as blank and deleted if the line number is followed by a space

```
Enter in . p 'g'ah and SAVE it.
Then RUN it to load the machine
code into mem y if correct. Then
r the machine code by -
PRINT USR 32625 which will PRINT
the number c bytes deleted and
when the BASIC Program is LISTed
the REMS and blank lines will be
seen to have been deleted.

   1 REM *** REM DELETE ***
   2 REM © John D. Ingleson
   3 REM       17/01/84
   4 REM For blank lines - ust
type LINE NUMBER   SPACE   then
ENTER
   5
  10 CLEAR 32624
  20 FOR a=32626 TO 32765
  30 READ b  POKE a b
  40 NEXT a
  45
1000 DATA 33 0 0 34,254 91 4e 92
 92 229 227 91 75,92.167 237 52
 48 109 225
1005
1010 DATA 35 35 229 203.75,35 70
 35,126,254,234 40 13 254 32 40
 4 213 225 167
1015
1020 DATA 237 74 35,35 24,219 22
9 167 237 74 229.237 91 75 92 23
5 167 237 82 175
1025
1030 DATA 180 181 40 52 229 193
225 209 27,27 27,27 217 213.229
237 176 225 209.167
1035
1040 DATA 237 82 229 17 254.91 2
37 75,254 91 167,237,74 235 115
35 114 225,237 91
1045
1050 DATA 75 92 235,167,237 82 1
7 75 92,235,115 35,114 225 24 14
9 225 209 27 27
1055
1060 DATA 27 27 3,3,3,3,24 200 2
37 75 254.91 209 197,42 75 92 29
5,232,25 193 201
1065
1070 REM SAVE PROGRAM BEFORE
     RUNNING IT IN CASE OF ERROR

To SAVE the CODE (87) use just-

 SAVE  REMDELETE CODE nnnn 142

    where nnnn is any suitable
address from which to run the
machine code.
Then to use the code -

CLEAR nnnn-1
LOAD   CODE nnnn

And to execute the code -

PRINT USR nnnn

- which will PRINT the number
of bytes of REMs deleted.
```



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ADVANCED COMPUTER ENTERTAINMENT

Unifile on disc

Ian Robertson *explains how to amend Unifile to work on disc systems*

There must be many Dragon users who owe a debut of gratitude to David Lawrence for his excellent *Unifile* published in *The Working Dragon* and, incidentally, serialised in *Popular Computing Weekly*. The speed of access to data and the extremely simple search routine make this a very useful utility for forgetful school-teachers like myself and others who are always hoarding useless (and other) bits of information.

The arrival of the Dragon disc system made me wish to avoid the rather long waiting periods involved with cassette files so I adapted module 1.1.10 to work with Dragondos. Program (1) was the result. The various Rem statements which appear to have no reason for existence are to keep the program lines identical to the original.

I first saved my original cassette copy to disc calling it *Unifilec* then amended lines 6000 onwards and saved this to disc as *Unified*. I originally hoped that by loading the cassette version, loading in the data from cassette — then stopping the program and using the Dragondos *Chain* command to load the disc version — the data would remain in its pristine state and could then be saved to disc. Alas, it didn't like it very much. So, not wishing to spend hours working out why, I evolved program (2) which loads data from casette and saves it to disc (this version is known as *Unifilex*).

Perhaps these ideas may be of help to other Dragon disc system purchasers (or prospective purchasers). The increased speed of retrieval of information takes some of the sting out of the cost of the disc system.

Program 1

```
6000 REM************************
6010 REM DATA FILES (FROM AND TO
        DISC SYSTEM)
6020 REM************************
6030 CLS:PRINT"INSERT DISC IN DR
IVE
6040 REM
6050 PRINT:PRINT"FUNCTIONS AVAIL
ABLE:","1)SAVE DATA".."2)LOAD DA
TA":INPUT"WHICH DO YOU REQUIRE:"
;Q:ONQ GOTO6070,6190
6060 RETURN
6070 CLS:INPUT"WHAT IS THE FILEN
AME(MAX 8 CHRS)":FI$
6080 FWRITE FI$:X
6090 REM
6100 FORI=0TO  X-1
6110 FWRITE FI$:A$(I)
6120 NEXTI
6130 FWRITE FI$:N
6140 FORI=1TO N-2
6150 FWRITE FI$:B$(I)
6160 NEXTI
6170 RETURN
6180 REM
6190 PCLEAR1:CLEAR20000:DIMB$(49
9)
6200 CLS:INPUT"WHAT IS THE FILEN
AME";FI$
6210 FREAD FI$:X
6220 DIMA$(X)
6230 FORI=0TO X-1
6240 FLREAD FI$:A$(I)
6250 NEXT
6260 FREAD FI$:N
6270 FORI=1TO N-2
6280 FLREADFI$:B$(I)
6290 NEXT
6295 REM
6300 B$(0)=CHR$(0)+" '
6310 B$(N-1)=CHR$(255)+"  "
6320 GOTO1000
```

Program 2

```
6000 REM************************
6010 REM DATA FILES (FROM
         CASSETTE TO DISC)
6020 REM************************
6030 CLS:PRINT"INSERT DISC IN DR
IVE
6040 PRINT"INSERT CASSETTE AND P
RESS PLAY"
6050 PRINT:PRINT"FUNCTIONS AVAIL
ABLE:","1)SAVE DATA TO DISC","2)
LOAD DATA FROM CASSETTE":INPUT"W
HICH DO YOU REQUIRE:";Q:ONQ GOTO
6070,6190
6060 RETURN
6070 CLS:INPUT"WHAT IS THE FILEN
AME(MAX 8 CHRS)";FI$
6080 FWRITE FI$:X
6090 REM
6100 FORI=0TO  X-1
6110 FWRITE FI$:A$(I)
6120 NEXTI
6130 FWRITE FI$:N
6140 FORI=1TO N-2
6150 FWRITE FI$:B$(I)
6160 NEXTI
6170 RETURN
6180 REM
6190 PCLEAR1:CLEAR20000:DIMB$(49 9)
6200 OPEN"I",£-1,"UNIFILE"
6210 INPUT£-1,X
6220 DIMA$(X)
6230 FORI=0TO X-1
6240 INPUT£-1,A$(I)
6250 NEXT
6260 INPUT£-1,N
6270 FORI=1TO N-2
6280 INPUT£-1,B$(I)
6290 NEXT
6295 CLOSE£-1
6300 B$(0)=CHR$(0)+"^"
6310 B$(N-1)=CHR$(255)+" "
6320 GOTO1000
```


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Commodore 64

Graphic creator

***R Patel** presents a sprite creator program which allows you to create a graphic character on a 24x21 grid*

Sprite Creator is a program for the Commodore 64 which calculates the values of the data to be *Poked* into a memory block to define a sprite. The program allows you to create a sprite graphic character on a 24x21 grid.

Once the character is defined on the grid, you can see the actual sprite being created by pressing *S* after this, you can get a printout of the 63 sprite data onto the screen or to the printer.

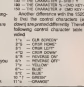
In this case a Commodore 1520 printer was used. The program can work without the routine at line 6000 and it can also be made to work with other printers by changing the printer routine.

The instructions to use the program are:

- 0 — CURSOR UP
- L — CURSOR DOWN
- P — CURSOR RIGHT
- O — CURSOR LEFT
- C — CLEARS GRID
- * — FILL/ERASE
- S — CREATE TRUE SPRITE

After the actual sprite is created, you have the following choices:

- 0 — MAKE CHANGES TO SPRITE
- 1 — PRINT DATA ONTO SCREEN
- 2 — PRINTOUT OF DATA FROM A PRINTER



As the listing is from a Commodore 1520 printer the following lines have some unusual characters which are as follows:

110 — THE CHARACTER $–CMD KEY+@
130 — THE CHARACTER y–SHIFT Y
130 — THE CHARACTER %–CMD KEY+G
150 — THE CHARACTER # CMD KEY+T

Another difference with the 1520 printer is that the control characters (eg *Crsr down*) are printed differently. Therefore, the following control character table is provided:

1"s — CLR SCREEN"
2"S — CRSR HOME"
3"] — CRSR LEFT"
4"Q — CRSR DOWN"
5"R — REVERSE ON"
6"r — REVERSE OFF"
7"¥ — YELLOW"
8"← — BLUE"
9"£ — BLUE"
10 "↑ — GREEN"
11"o — ORANGE"

```
1 REM*************************************
2 REM*                                   *
3 REM*         SPRITE CREATOR            *
4 REM*                                   *
5 REM*          BY R.M.PATEL             *
6 REM*                                   *
7 REM*          (C) 15/2/84              *
8 REM*                                   *
9 REM*************************************
10 REM************INITIALISE*************
15 POKE 53281,0:POKE 53280,0
20 DIM T(22,3):E=-3:POKE 650,128
30 S=1024:X=1:Y=2:C=54272
40 REM**********INITIALISE SPRITE*******
50 V=53248:POKE 2042,13
60 FOR I=0 TO 62:POKE 832+I,255:NEXT:POK
E V+4,245:POKE V+5,150
70 INPUT "COLOUR OF SPRITE?(0-15)";A
80 IF A<0 OR A>15 THEN 70
85 CO=A:POKE V+41,CO:POKE V+21,4
90 PRINT "s"
100 REM*************PRINT GRID**********
105 PRINT "s]]]]]R SPRITE CREATOR"
110 PRINT "SQ]$$$$$$$$$$$$$$$$$$$$$$$$$"
120 FOR I=1 TO 21
130 PRINT "    y                        /"
140 NEXT
150 PRINT "    ]########################"
160 REM*********INSTRUCTIONS************
19  FOR Y=2 TO 22:FOR X=1 TO 3:T(Y,X)=0
NEXT X,Y:POKE V+21,0
200 E=-3:X=1:Y=2:PRINT "S]]]]]]]]]]]]]]
]]]]]]]]]]]]]]0-↑CURSOR UP"
210 PRINT "SQ]]]]]]]]]]]]]]]]]]]]]]]]]]]]]
L ↑CURSOR DOWN"
220 PRINT "      ]]]]]]
O ↑CURSOR LEFT"
230 PRINT "
]P-↑CURSOR RIGHT"
240 PRINT "SQQQ]]]]]]]]]]]]]]]]]]]]]]]]]]]
]]C-↑CLEARS GRID"
245 PRINT "
]]]*-↑FILL/ERASE"
250 PRINT "
]]]]S-↑CREATE TRUE"
260 PRINT "SQQQQQQ]]]]]]]]]]]]]]]]] ]]]]]
]]]]]]]SPRITE"
299 REM*************MAIN LOOP************
*
300 GET A$
310 IF A$="S" THEN 500
320 IF A$="0" THEN Y=Y-1
330 IF A$="L" THEN Y=Y+1
340 IF A$="O" THEN
350 IF A$="P" THEN X=X+1
360 IF A$="C" THEN GOSUB 190
370 IF X<1 THEN X=1
380 IF X>24 THEN X=24
390 IF Y-1<1 THEN Y=2
400 IF Y+1>22 THEN Y=22
410 P=S+X+Y*40
420 IF PEEK(P)=100 THEN
430 IF PEEK(P)<>100 THEN
440 PO=PEEK(P)
445 POKE P,100:POKEP+C,COL
450 IF A$="*" AND CHECK=1       POKE P,32
PO=PEEK(P)
460 IF A$="*" AND CHECK=0
0:PO=PEEK(P):POKE P+C,COL
465 POKE P,PO:POKEP+C,COL
470 GOTO 300
499 REM***********CREATE SPRITE*********
500 GOSUB 2000
520 PRINT "
]]RCREATING"
530 PRINT "SQ]]]]]]]]]]]]]]]]]]]]]]]]]]]]]
]]RSPRITE"
540 PRINT "SQQ]]]]]]]]]]]]]]]]]]]]]]]]]]]]
]]]RNOW"
550 FOR Y=2 TO 22
560 E=E+3
570 FOR X=1 TO 24
580 IF X=1 OR X=9 OR X=17 THEN
590 IF X=2 OR X=10 OR X=18 THEN A=6
600 IF X=3 OR X=11 OR X=19 THEN A=5
610 IF X=4 OR X=12 OR X=20 THEN A=4
620 IF X=5 OR X=13 OR X=21 THEN A=3
630 IF X=6 OR X=14 OR X=22 THEN A=2
640 IF X=7 OR X=15 OR X=23 THEN A=1
650 IF X=8 OR X=16 OR X=24 THEN A=0
660 IF PEEK(         )=160 THEN GOSUB 300
0
670 POKE 832+E,T(Y,1):POKE 832+E+1,T(Y,
2):POKE 832+E+2,T(Y,3)
680 NEXT X
690 NEXT Y
69  REM***       AFTER CREATING SPRITE
700 GOTO 6000
710 PRINT "
MAKE CHANGE"
720 PRINT "SQ]
TO SPRITE"
730 PRINT "
↓PRINT DATA"
740 PRINT "SQQQ]]]]]]]]]]]]]]]]]]]]]]]]]]]
]]]ONTO SCREEN"
750 PRINT "
]]]]SCREEN"
```



```
N (0 3)?
OR I  0 20 NEX
750 GET A$   A$=  THEN 920
80  A  L  $ .  A<0 OR A>3 T N
810 GOT 9
    IN
TYPE IN (0 3 ?)
925 FOR I=0 TO 20 NEXT GOTO 780
    =0  V 21,0 IF A=0   N GOTO 4000
 I  A     N GOTO 5000
    A 2   N GOTO 6000
  ND
  R M********CLEAR GRID***********
    R X    0 24.FOR Y-2 TO 22.POKE S+
  40,32   Y,X X 1  -2.RETURN
  REM** **********ERASE MESSAG *****
  F R   20    39 FOR  =0  0 14.POKE S
 Y*40.32.NEX Y.< X-1 Y=2 RE URN
3000 I   >   AND X< 8 THEN  (Y,1)=T(Y,1)
 250
3010 IF X>-9 AND X -16  HEN  (Y,2)=T(Y,2
) 250
3020 IF  >=17 AND  <-24 THEN  (Y,3)=T Y,
3  50
3030 R TURN
3999 REM ******ALTER SPRITE**********
4000 GOSUB 2000 GOTO 195
4999 RE  **** SPRIT   AT   N   9       ***
*
5000 P I  $$
     BIN
       N
5020 PR N
5030
5050 PR N
5060 NEXT
5070 G
5995   M ***
5996   M****
5997 R
I TER BI
59   EM 2
5999  EM ****
6000   E M
6010  PL
6020     IT
E PL
6030
OE INL
604
6050
6060 PRINT
2).
6070
6080
6090 PRINT
610
6120 RE *********
6130  EN

PR
```

Some like it hot

***Robert Crook** presents a program for calculating the affects of heat on vanous substances*

This program for the BBC Model B, is designed to help people taking their Physics 'O level The program carries out heat calculations involving the 'Method of Mixtures

You are required to input data If the computer asks for a value you are trying to find then enter *F* for 'Find Out It the computer asks for a value that you have not been given and that you do not wish to find, then merely press *Return* If you do know a value, such as a specific heat value, but do not wish to type the number in then press *G* for 'Get value' The computer will then look this value up and place it in the appropnate place

Here is one example

Input the data as required	
Mass of the container (Kg)	RETURN (There is ne container)
Container made of	RETURN
Substance is initially	ICE
Substance turns to	STEAM
Initial temperature	0
Final temperature	100
Temperature range	F (We can make the computer find this)
Mass of substance	2 (There are 2Kg of ice)
Specific Heat Capacity of substance	G (Look up this value)
Specific Heat Capacity of container	RETURN (No container)
If there is another substance name it	RETURN (No other substance)
Mass of substance	RETURN (As above)
Heat temperature	RETURN (As above)
Specific Heat Capacity	RETURN (As above)
Heat energy required	F (We want the computer to find this)
Time (Seconds)	RETURN
Power rating (Watts)	RETURN
Value for the latent heat of vaporisation	G (Look this value up)
Value for the latent heat of fusion	G (Look this value up too)

This data is what you would have to enter if you were trying to solve the following problem Calculate the heat energy in Joules required to convert 2kg of ice at 0 deg C to 2kg of steam at 100 deg C

After you have entered the data, the computer will print out the values of the unknowns on the bottom of the screen

This problem is fairly simple — next week we'll look at a more difficult one

```
>L.
   10REM***************************
   20REM*  Heat Calculations    *
   30REM*     By R.Crook        *
   40REM*     (c)  1984         *
   50REM***************************
   60ON ERROR GOTO 2630
   70MODE 7
   80VDU 23;8202;0;0;0;
   90PROCSTART
  100*FX 15,0
  110CLS
  120PROCINTRO
  130CLS
  140REPEAT
  150PROCGETDATA
  160PROCINPUT
  170PRINT"____________________________
     ___________"
  180@%=&020309
  190PRINTTAB(13)CHR$(133);CHR$(141)
     "Answers"
  200PRINTTAB(13)CHR$(133);CHR$(141)
     "Answers"
  210PROCVAR
  220PRINT TAB(8)CHR$(134);CHR$(136)
     "Problem solved"
  230PRINT"Would you like to alter any
     Data(Y/N)"
  240C$=GET$:IF C$<>"Y" AND C$<>"N"
     THEN 240 ELSE IF C$="Y" THEN CLS:
     PROCALTER:CLS:GOTO 190
  250RUN
  260UNTIL FALSE
  270END
  280DEFPROCINTRO
  290PRINT'
  300PRINT CHR$(141);CHR$(129);CHR$
     (157);CHR$(131)"
     Physics Heat Calculations"
  310PRINT CHR$(141);CHR$(129);CHR$
     (157);CHR$(131)"
     Physics Heat Calculations"
  320PRINT'
  330PRINT"This program is designed as
     an aid to   heat calculations.You
     will be required  to input the data
     you have.If you do nothave the data
     the computer is asking forthen
     press the RETURN."
  340PRINT"If the purpose of the calcu
     lation is to find the quantity the
     computer is askingfor then input an
     'F' for FIND OUT.The  computer will
     then try to determine thisvalue."
  350PRINT"If you know a value,such as
     the latent  heat of fusion of ice,
     but you do not    wish to type it
     in press 'G' for GET    VALUE."
  360PRINTTAB(4,21)"Press any key to
     continue"
  370A=GET:ENDPROC
  380DEFPROCINPUT
  390PRINTCHR$(141);CHR$(130)"Input
     Data as explained"
  400PRINTCHR$(141);CHR$(130)"Input
     Data as explained"
  410RESTORE 530
  420FOR A%=1 TO 19
  430READ A$(A%):PRINT CHR$(131)A$(A%);
     :INPUT TAB(30)B$(A%):IF (A%=5 OR
     A%=6 OR A%=13) AND VAL(B$(A%))=0
     AND (B$(A%)<>"0" AND B$(A%)<>"F")
     THEN B$(A%)="":GOTO470
  440IF B$(A%)="G" THEN PROCGET(A%)
  450IF B$(A%)=""AND (A%<>5 AND A%<>6
     AND A%<>13) THEN 510
  460IF B$(A%)="F" AND (A%<>5 AND A%<>
     6AND A%<>13) THEN 500
  470IF B$(A%)="" THEN B$(A%)="999"
  480A(A%)=VAL(B$(A%))
  490GOTO 510
```

```
500A(A%)=1
510NEXT
520ENDPROC
530DATA Mass of container(kg),Con
   tainer made of,Substance is initi
   ally,Substance turns to
540DATA Initial temperature(deg C),
   Final temperature(deg C),Temper
   ature range(deg C),Mass of
   substance(kg),Shc of substance
550DATA Shc of the container
560DATA If another sub.name it,Mass
   of add.sub.(kg),Initial temp. of
   add. sub.,Shc of add. substance,
   Heat energy required(J),Time
   (seconds),Power rating(watts)
570DATA Latent heat of vaporization,
   Latent heat of fusion
580DEFPROCVAR
590IF B$(5)()"F" AND B$(6)()"F" AND
   B$(5)()"999" AND B$(6)()"999"
   THEN A(7)=ABS(A(6)-A(5)):S$(7)=""
600IF (B$(3)="STEAM" OR B$(4)="STEAM"
   OR B$(11)="STEAM") AND B$(18)()"F
   " AND A (18)=0 THEN A(18)=2260000
610IF (B$(3)="ICE" OR B$(4)="ICE" OR
   B$(11)="ICE") AND B$(19)()"F" AND
   A(19)=0 THEN A(19)=336000
620C=0:K=0
630FOR I%=1 TO 10
640IF B$(I%)="F" THEN C=C+1:K=I%
650NEXT
660IF B$(18)="F" THEN C=C+1:K=18
670IF B$(15)="F" THEN C=C+1:K=15
680IF B$(19)="F" THEN C=C+1:K=19
690IF (B$(7)="F" OR B$(6)="F" OR B$
   (5)="F") AND B$(11)="" AND A(15)
   ()0 AND A(15)()1  THEN PROCQMCT
   :ENDPROC
700IF (B$(18)="F" OR B$(19)="F") AND
   (A(15)=0 OR B$(15)="F") THEN
   PROCMCTMCT:ENDPROC
710IF (B$(16)="F" OR B$(17)="F") AND
   A(15)()0 AND K=0 THEN K=-1:
   PROCQMCT:GOTO7 60
720IF B$(13)="F" OR B$(5)="F" OR B$
   (6)="F" OR B$(14)="F" THEN
   PROCMCTMCT:ENDPR OC
730IF (B$(9)="F" OR B$(10)="F") AND
   (A(15)=0 OR B$(15)="F") THEN
   PROCMCTMCT:EN DPROC
740IF (B$(8)="F" OR B$(12)="F" OR
   B$(1)="F") AND (A(15)=0 OR B$
   (15)="F") THEN PROCMCTMCT:ENDPROC
750PROCQMCT
760ENDPROC
770DEFPROCQMCT
780IF B$(3)()"ICE" AND B$(4)()"ICE"
   THEN A(19)=0
790IF B$(3)()"STEAM" AND B$(4)()
   "STEAM" THEN A(18)=0
800IF K=-1 THEN 980
810B(1)=A(8)*A(19)
820B(2)=A(8)*A(9)*A(7)
830B(3)=A(1)*A(10)*A(7)
840B(4)=A(8)*A(18)
850IF K=15 THEN T=B(1)+B(2)+B(3)+B(4)
   :PRINTA$(K);"=";T:A(15)=T:GOTO 980
860IF A(15)()0 THEN Q=A(15)
870IF K=7 OR K=8 THEN PROCFIND:GOTO960
880IF K=19 THEN F=1
890IF K=9 THEN F=2
900IF K=1 OR K=10 THEN F=3
910IF K=18 THEN F=4
920FOR I%=1 TO 4
930IF I%=F THEN 950
940A(15)=A(15)-B(I%)
950NEXT
960PRINT'A$(K);"=";A(15)/B(F):A(K)
   =A(15)/B(F)
970A(15)=0
980IF A(15)()0 AND B$(16)="F" AND
   A(17)()0 THEN PRINTA$(16);A(15)/A
   (17):A(16)= A(15)/A(17)
990IF A(15)()0 AND B$(17)="F" AND
   A(16)()0 THEN PRINTA$(17);A(15)
   /A(16):A(17)= A(15)/A(16)
1000PROCTEMPERATURE
1010ENDPROC
1020DEFPROCDATA(V$,R%)
1030IF R%=9 AND (B$(3)="ICE" OR B$(3)
   ="WATER" OR B$(3)="STEAM") THEN
   B$(R%)="42 00":ENDPROC
1040IF R%=14 AND (B$(11)="ICE" OR B$
   (11)="WATER" OR B$(11)="STEAM")
   THEN B$(R%) ="4200":ENDPROC
1050U=0
1060FOR I%=1 TO 14
1070IF D$(I%)=V$ THEN B$(R%)=T$(I%):U=1
1080NEXT
1090IF U=0 THEN PRINT" Not in memory":
   INPUT" Type number in now."TAB(30)
   B$(R%)
1100ENDPROC
1110DEFPROCGETDATA
1120DIM D$(14),T$(14),B(4),C(4),D(4),
   A$(19),B$(19),A(19)
1130RESTORE 1210
1140FOR I%=1 TO 14
1150READ D$(I%)
1160NEXT
1170FOR I%=1 TO 14
1180READ T$(I%)
1190NEXT
1200ENDPROC
1210DATA LEAD,MERCURY,BRASS,COPPER,
   WOOD,TURPENTINE,PARAFFIN,IRON,
   GLASS,ALUMINIUM,ZINC,METHYLATED
   SPIRITS,BRINE,WATER
1220DATA 140,140,370,380,1680,1800,
   2100,460,670,840,380,2400,3000,
   4200,2100
1230DEFPROCFIND
1240IF K=7 THEN T=B(2)+B(3):A(15)
   =A(15)-B(1)-B(4):F=2:B(F)=T
1250IF K=8 THEN T=B(1)+B(2)+B(4):A(15)
   =A(15)-B(3):F=2:B(F)=T
1260ENDPROC
```

continued next week



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1984 IS the year of The Game Lords

Open Forum

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

Correlation

on Spectrum

This program, which runs on the 16K Spectrum, calculates the product-moment correlation coefficient of a set of data.

It would be very useful for anyone using or studying statistics. Also, it could be quite easily converted to run on other home computers.

Program notes

12-35	Initialisation
37-130	Enter data
200-210	Calculate coefficient
300-380	Print coefficient

```
  10 REM Correlation Coefficient
          © M.Coombes 1983
  12 PAPER 0  BORDER 0. CLS   IN
K 7:
  15 LET sumxx=0. LET sumyy=0  L
ET sumx=0  LET sumy=0  LET sumxy
=0
  20 INPUT "How many values of x
? ",nx
  30 BEEP .1,1
  36 DIM x(nx): DIM y(nx)
  37 REM
        #INPUT DATA#
  40 PRINT AT 15,0,"Please enter
all the values       of x,each fo
llowed by ENTER..."
  50 FOR f=1 TO nx
  60 INPUT x(f)
  66 BEEP .1,1
  67 LET sumx=sumx+x(f)
  68 LET sumxx=sumxx+(x(f)↑2)
  70 PRINT AT 19,0,"
                   ",AT 19,0,"x
value ";f;" = ",x(f)
  80 NEXT f
  90 CLS
 100 BEEP .4,10
 110 PRINT AT 15,0,"Please enter
all the values       of y,each fo
llowed by ENTER..."
 120 FOR f=1 TO nx
 130 INPUT y(f)
 140 BEEP .1,1
 141 LET sumxy=sumxy+(x(f)*y(f))
 142 LET sumyy=sumyy+(y(f)↑2)
 148 LET sumy=sumy+y(f)
 150 PRINT AT 19,0,"
                   ",AT 19,0,"y
value ";f;" = ";y(f)
 160 NEXT f
 166 BEEP .4,10
 170 LET suma=sumx↑2: LET sumb=s
umy↑2
 200 REM
      #CALCULATE COEFFICIENT#
 210 LET co=(sumxy-((sumx*sumy)/
nx))/(SQR ((sumxx-(suma/nx))*(su
myy-(sumb/nx))))
 300 REM
        #PRINT COEFFICIENT#
 305 CLS
 310 PRINT AT 9,0,"The product m
oment correlation  coefficient f
or your data is:",,
 320 PRINT INK 0,co
 330 PRINT AT 15,0, INK 6,"Press
A to enter new data"'''"Press B
to exit"
 340 IF INKEY$="a" OR INKEY$="A"
THEN RUN
 350 IF INKEY$="b" OR INKEY$="B"
THEN STOP
 360 GO TO 340
```

Correlation
by Mike Coombes

Grave Robber

On Vic 20

This program will work on the unexpanded machine. It is fully documented within the program by Rem statements. Controls are:

F1	=	Up
F3	=	Down
A	=	Left
D	=	Right

```
10 REM * GRAVE ROBBER *
20 REM * K. DENT 31/12/83 *
30 POKE56,27 PRINTCHR$(8),CHR$(14)
40 GOSUB560 PRINTCHR$(142) CLR N$="---"
50 PRINT"J" POKE36879,10 POKE36869 255
60 FORA=7702TO7723 POKEA+30720 6 POKEA,6 POKEA+30720+462,6 POKEA+462,0 NEXT
70 FORA=7795TO7806 POKEA+30720,6 POKEA 0 POKEA+286+30720 6 POKEA+286,0 NEXT
80 FORA=7724TO8142STEP22 POKEA+30720,6 POKEA,0 POKEA+30720+21 6 POKEA+21,0 NEXT
90 FORA=7884TO7995STEP22 POKEA+30720,6 POKEA 0 POKEA+9+30720,6 POKEA+9,0 NEXT
100 PRINT"SCORE  0    HI "HI A=7932 D=0 SC=1 S3=36876 S4=S3+1 V=S3+2
110 POKEV,8 GOSUB400
120 POKEA+30720,4 POKEA,1
130 GETA$
140 IFA$="■"THEND=1
150 IFA$="■"THEND=2
160 IFA$="A"THEND=3
170 IFA$="D"THEND=4
180 IFD=1THENA=A-22 POKEA+22,32
190 IFD=2THENA=A+22 POKEA-22,32
200 IFD=3THENA=A-1 POKEA+1,32
210 IFD=4THENA=A+1 POKEA-1,32
220 POKES3,0
230 IFPEEK(A)=0ANDD=1THENA=A+22 D=2 GOSUB350
240 IFPEEK(A)=0ANDD=2THENA=A-22 D=1 GOSUB350
250 IFPEEK(A)=0ANDD=3THENA=A+1 D=4 GOSUB350
260 IFPEEK(A)=0ANDD=4THENA=A-1 D=3 GOSUB350
270 IFPEEK(A)=3THEN450
280 IFPEEK(A)=2THENPOKEA+30720,4 POKEA,1 GOSUB370
290 IFSC<=200THENT$="000004'
300 IFSC>200ANDSC<=400THENT$="000003"
310 IFSC>400ANDSC<=600THENT$="000002"
320 IFSC>600THENT$="000001
330 IFTI$=T$THENPOKEG+30720,1 POKEG,3 GOSUB400
340 GOTO120
350 REM * REBOUND NOISE *
360 POKES3,175 RETURN
370 REM * SCORING *
380 FORSC=SC-1TOSC+10 POKES3,179 PRINT"▶▶▶▶▶"SC
390 FORP=1TO50 NEXT POKES3,0 NEXT
400 REM * POSITION GRAVES *
410 G=7703+INT(RND(1)*459)+1
420 IFPEEK(G)=0ORPEEK(G)=1ORPEEK(G)=3THEN410
430 POKEG+30720 5 POKEG,2 TI$="000000"
440 RETURN
450 REM * KILLED *
460 POKEA+30720,3 POKEA,4
470 POKES4 220 FORA=15TO0STEP-1 POKEV,A FORP=1TO300 NEXTP,A POKES4,0 POKEV,0
480 POKE36869 240 PRINT"YOU HAVE CRASHED INTO A GHOST !!!" SC=SC-1
490 PRINT"SCORE ="SC
500 IFSC>HITHENHI=SC PRINT"YOU HAVE THE HI-SCORE INPUT YOUR INITIALS" INPUTN
$
510 PRINT'HI-SCORE ="HI"BY "LEFT$(N$,3)
520 PRINT" ANOTHER GAME (Y/N) ? "
530 GETA$ IFA$="Y"THEN50
```

```
540 IFA$="N"THENSYS10
550 GOTO530
560 REM * INSTRUCTIONS *
570 S=0 POKE36879,14 PRINT"************************************RAVE -OBBER*****",
580 PRINT'*****Y -. ENT**********************************'
590 PRINT' IOU,THE GRAVE ROBBER  MUST TRY TO ROB EACH  GRAVE FOR 10 POINTS."
600 PRINT" F YOU LEAVE A GRAVE  UNROBBED TOO LONG A   GHOST WILL APPEAR IN",
610 PRINT"  ITS PLACE."
620 FORP=1TO2000 NEXT PRINT'PRESS 'F7' TO CONTINUE'
630 GETA$ IF3=2ANDA$=""THEN660
640 IFS=1ANDA$=""THENRETURN
650 IFA$<>""THEN630
660 S=1 PRINT" F YOU HIT THE GHOST  THE GAME IS OVER."
670 PRINT" F YOU HIT THE BLUE  BLOCKS YOU WILL BOUNCEBACK THE WAY YOU CAME."
680 PRINT'CONTROLS -"
690 PRINT"              'F1'"
700 PRINT"            -"
710 PRINT"              'F3'"
720 REM * DEFINE CHARACTORS *
730 FORA=7168TO7207 READB POKEA,B NEXT
740 FORA=7424TO7431 POKEA 0 NEXT
750 DATA127 127,127,127 127,127,127,3
760 DATA24,60,24 126,189,189,36,102
770 DATA60,102,231,129,231,231,231,255
780 DATA24,60,60,126 219 255 255,219
790 DATA129,66,60,36,36,60,66,129
800 GOTO620
```

Grave Robber
by K Dent

Median

On Spectrum

This program, for the 16K Spectrum, calculates the mean, the median and the mode of any set of data. The program is very user-friendly and contains error traps at every stage.

Program notes

10-32	Initialisation
35-105	Enter data
110-180	Select option from menu
500-800	Error found in data
1000-1080	Mean
2000-2210	Calculate median
3000-3110	Calculate mode
4000-4100	Sort data
5000-5080	Print answer

```
  5 REM Mean,Median and Mode
       © M.Coombes 1983
  10 FOR f=0 TO 7: READ a  POKE
USR "a"+f,a  NEXT f
  20 LET fl=0  INK 7: PAPER 0  B
ORDER 0  CLS
  30 PRINT "How many data items?
",  INPUT di  PRINT di
  32 IF di<3 THEN GO TO 20
  35 REM
       #INPUT DATA#
  40 PRINT ''"Please enter your
data..."
  45 FOR f=1 TO di
  60 PRINT AT 5,0;"Data item ",
FLASH 1,f, FLASH 0;"?"
  60 INPUT LINE a$
  62 IF a$="" THEN GO TO 500
  65 IF a$(1)="a" OR a$(1)="S" O
R a$(1)=" STOP " THEN STOP
  70 FOR t=1 TO LEN a$  IF a$(t)
="." THEN GO TO 80
  75 IF a$(t)>"9" OR a$(t)<"0" T
HEN GO TO 500
  80 NEXT t
  90 LET i(f)=VAL a$
  95 PRINT AT 5,15,"          ";A
T 5,15, INK 3,i(f)
 100 NEXT f
 105 GO SUB 4000
 110 CLS   PRINT '''"Please selec
t:"''''''"1  =  Mean"'''"2  =  Me
dian"'''"3  =  Mode"'''"4  =  Ente
r new data"
 120 IF INKEY$="1" THEN PRINT AT
 8,0, FLASH 1,1. BEEP 0.7,1. GO
TO 1000
 130 IF INKEY$="2" THEN PRINT AT
 10,0, FLASH 1,0. BEEP 0.7,1  GO
 TO 2000
 140 IF INKEY$="3" THEN PRINT AT
 12,0, FLASH 1;3: BEEP 0.7,1  GO
 TO 3000
 150 IF INKEY$="4" THEN PRINT AT
 14,0, FLASH 1,4: RUN
 155 GO TO 120
 500 REM
       #USER ERROR#
 505 PRINT AT 5,0, FLASH 1; INK
0,"ERROR", FLASH 0; INK 0;" Re-e
nter data item"
```

Open Forum

```
800 PAUSE 100: PRINT AT 6,0;"
     ": GO TO 5
0
1000 REM
        @MEAN@
1010 LET tot=0
1020 FOR f=1 TO di
1030 LET tot=tot+i(f)
1040 NEXT f
1050 LET ans=tot/di: LET a$="Mea
n"
1060 GO TO 5000
2000 REM
        #MEDIAN#
2005 LET a$="Median"
2007 LET j=di/2
2010 IF j<>INT j THEN GO TO 2200
2020 LET ans=(i(j)+i(j+1))/2
2030 GO TO 5000
2200 LET ans=i((di/2)+1)
2210 GO TO 5000
3000 REM
        @MODE@
3005 FOR s=1 TO 2
3010 FOR f=1 TO di
3030 FOR g=1 TO f: IF i(g)=i(f)
THEN LET m(g)=m(g)+1: LET w(g)=i
(f): LET fl=0
3040 NEXT g: IF fl=0 THEN LET m(
f)=1
3050 LET fl=0
3060 NEXT f
3080 LET top=0: FOR f=1 TO di: I
F m(f)>top THEN LET top=f
3090 NEXT f
3095 NEXT s
3100 LET ans=w(top): LET a$="Mod
e"
3110 GO TO 5000
4000 REM
        @SORT DATA@
4010 FOR f=1 TO di
4020 LET a=f
4030 FOR j=f+1 TO di
4040 IF i(a)<=i(j) THEN GO TO 40
60
4050 LET a=j
4060 NEXT j
4080 LET c=i(f): LET i(f)=i(a):
LET i(a)=c
4090 NEXT f
4100 RETURN
5000 REM
        #PRINT OUT ANSWER#
5010 CLS : PRINT AT 3,0;"The ";a
$;" of your data is "
5020 LET a$=STR$ ans
5030 FOR f=0 TO LEN a$-1: PRINT
INK 2;AT 5,f;"-";AT 7,f;"-": NEX
T f
5040 PRINT AT 6,0;ans
5060 PRINT '''' INK 2;"Press any
 key"
5070 PAUSE 0
5080 GO TO 110
8000 DATA 0,0,0,285,255,0,0,0
```

Medien
by Mike Coombes

Microradio

GW6JJN

A common language

Nowadays, many radio stations are providing computer oriented radio programs to cater for the millions of people who now own home computers. Among them are BBC Radio Four, BBC Wales and several commercial stations. In order to use the medium of radio to its full extent, the idea of transmitting computer programs over the air has become an exciting reality.

The technology involved in sending audio tones over broadcast radio doesn't pose any problems — the real difficulties lie in the fact that although most computers speak a dialect of Basic, no one brand of home computer is compatible with another. Bearing in mind also that if a radio station wishes to remain in business, it will not spend hours sending excruciating noises over the airwaves — not even the most hardened computer addicts can take that.

So, who gets the programs? Is it the best selling computers only, and there are a few of them, or should the BBC only send BBC Basic? Would that be fair? What is needed is an Esperanto, or common language for all computers.

Regular readers of *Popular Computing Weekly* will have seen the recent articles by Ian Logan regarding *Basicode* and the possibilities of its implementation on the Spectrum (see *PCW* 16-22, 23-28 February). Many of you have written in asking what *Basicode* is and can it be used on your computer. Microradio will attempt to answer these questions, particularly since *Basicode* was implemented by a radio station.

The Esperanto that I mentioned above wasn't very hard to find, in fact no-one had to look any further than the Netherlands. The Dutch radio service is called NOS and they have, for several years, transmitted a radio program called Hobbyscoop (pronounced Hobbyscope).

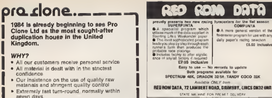
This program dealt with technology in general and hifi and computers in particular. In fact, the first of the strange noises to emanate from Hobbyscoop were not computer programs but audio tones to help people set up their stereo systems. It was a small step for them to explore the possibilities of sending programs for computers out over the ether. But there was still the problem of incompatibility between machines.

The proposal to invent a computer Esperanto came from a Dutch radio amateur called Klaas Robers. After much research and hard work the first version of NOS *Basicode* was developed. When limitations were recognised, Klaas Robers and Jochem Herrmann came up with what is now the recognised standard, correctly known as NOS *Basicode Two*. NOS *Basicode* can now be read by about 17 different brands of computers, including CP/M which makes the figure even higher.

Next week I shall go into *Basicode* a little more and tell you how you might implement it on your computer. ○

Ray Berry GW6JJN

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share, or topics that you would like to see covered, write to: Ray Berry, Microradio, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 3LD



Tony Bridge's Adventure Corner



Computer movie

Before we get on to more HHOF (you may remember that I ran out of space last week and had to leave the list halfway through) let's have a look at some problems people have been having with *Valhalla*

I think it would be redundant for me to give a detailed description of this program from Legend I call it "Program" because I hesitate to call it "Adventure" This is because of a conversation I had recently with John Peel — not the saviour of DJ dom (at least until he allowed himself to be dragged down to the level of the other buffoons on Top of the Pops), but the leader of the team that wrote *Valhalla*

He prefers to call it "a computer Movie" and I see no reason to deny him that privilege If you think about it and if you have seen the program you will probably agree with him But this movie is unique in that you can actually affect the course of events I nearly said dictate the course of events but *Valhalla* will not allow you to do this While playing or should that be participating I often find myself glancing over my shoulder (figuratively anyway), expecting to catch sight of more important events going on in Midgard than my puny attempts at apotheosis!

Although the manual says (on page 8), that "the six special objects can only be discovered in order", many people find that, in fact *Felstrong* can be found before *Ofnir* This is a small bug and is the only instance of such an occurrence being possible (in fact the bug is limited to the first 15,000 or so copies) If this has happened to you then count yourself lucky to have found an object out of sequence!

Another problem that many people have come across is that the program will crash if an object is placed in a chest Unfortunately, the program will only allow six objects on-screen at any time This number includes all those objects on the ground, in chests or in cupboards — so be careful where you chuck that unwanted sword! If you should exceed this limit good old Klepto should rush in and whip the extra object, thus keeping the program happy Sometimes he is asleep somewhere in *Valhalla*, and this is when the program crashes Should this happen to you, just type "*Goto 9800*" and *Enter* — you won't lose anything!

Valhalla is one of those Adventures that seems to generate a lot of discussion and controversy, with some people saying that it is the best thing that they have seen while others find it boring! If you are looking for a puzzle kind of Adventure, with combinations of words to be worked out then you will be disappointed — there are no secret words (a list of all possible combinations is included in the excellent manual) and the objects that have to be found are all in chests or cupboards so there is no mystery there either But visually the program is stunning and there is plenty to delight the combat enthusiast with lots of on-screen battles and punch ups! There is even a resident drunk in Mary

Quite a lot of questions about *Valhalla*, which I will leave until another Corner (soon though soon !) — until then if anyone would like to tell me of their experiences and hints that I can pass on, just let me know

Commodore 64 owners should not be despondent — *Valhalla* for the CBM will be released this month As I said when the Commodore version of *The Hobbit* was released — *you lucky people!*

On without pause to the Hobbit Hall of Fame

David Alter and *Andrew McNeil* of Perthshire with a score of 75 per cent *Stephen Robertson*, on his CBM64 — a score of 97 5 per cent — Stephen noticed a rather interesting Hobbitbug which is new to me (if you have come across this one let me know), in which the Red Golden Dragon appears in the Elvenking's Dungeon goes into the Wine Cellar through the Trap Door and into the River! Very strange! Stephen also found his 30 second romp home with the Treasure a bit of an anti-climax

David Sneddon of Wishaw in Scotland on his Spectrum Scores of 52 5 per cent and 70 per cent can be increased a little David by carrying the Golden Key

Jim Coyle, with 55 per cent on his Spectrum (see some hints later, if you want to get some more Jim) *John Sutcliffe* aged 13 (he didn't have any help Honest!) *Simon Jenkins* from Gwent and also aged 13 He had a score of 85 per cent and also a Hi-score of 3700 in *Inca Curse*

Gavin James Welch aged believe it or not, 8½ — not quite the youngest (some months ago we had an 8-year-old) but still an achievement and in just a couple of weeks at that!

Paul Lauff aged 32 (and no, Paul it doesn't matter!) after several months of trying Paul says that he is another satisfied Spectrum user — there are several thousand of us now! If you are still trying to get past the Tank in *Espionage Island* Paul I hope that you were helped by my clue of a couple of weeks ago

David Haskins of Colwyn Bay (65 per cent) *Patrick Ward* (14) of Derby and another Commodore 64 owner (another few thousand satisfied owners!), with scores of 80 per cent and 82 5 per cent — you'll have noticed in the past HHOF, Patrick, that it is indeed possible to gain 100 per cent on the Commodore

Mike Peach of Crewkerne in Somerset with a score of 62 5 per cent after many months of playing on and off (that's the way I like to tackle Adventures too, Mike) He has scored 756 points in the truly wonderful *Halls of the Things*

Jim Devlin of Belfast with 77 5 per cent in two weeks To get past the cat in *Smuggler's Cove* Jim, try this

AYRO RUYM RUIS STHC

More HHOF next week

This series of articles is designed for novice and experienced Adventurers alike Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter So if you have an Adventure you want reviewed or if you are stuck in an Adventure and cannot progress any further write to Tony Bridge Adventure Corner, *Popular Computing Weekly* 12 13 Little Newport Street London WC2R 3LD

Peek & Poke



NO SUCCESS

Alan Hill of Wrassland Crescent, Bishopton, Renfrewshire, writes

Q **As I was reading your articles on top ten games, I saw one called *Chequered Flag*, which I was interested in buying. I have tried several large stores in Glasgow, without any success. Could you tell me where I might purchase it?**

A I am surprised that you cannot find it, as it is one of Psion's programs marketed by Sinclair. It costs £6.95 and is available from Sinclair Research, Freepost, Camberley, Surrey GU15 3BR.

CENTRONICS OR NOT?

J Masterman of Hemlington, Cleveland, writes

Q **I have three data products 2230 drum printers. Ostensibly they appear to have a Centronics interface. This is not, however, the case. In point of fact, they have the familiar 36-way Amphernol plug, though the wiring is completely different.**

I have a standard Centronics interface on a dot matrix printer, and its leads to the pin-outs are completely different. So, can you tell me when a Centronics is not a Centronics?

A Unfortunately the 36-way Amphernol has become closely associated with the Centronics standard. However, the plug itself is just that — a plug. The actual standard is defined by the architecture of the computer; the plug just happens to be the way it gets to the outside world.

To be a Centronics interface, it must have a *busy* line, 8 data lines, *Strobe* and *Acknowledge*, a total of 11 signals, with a further eight ground lines in between. This must not be confused with a Centronics 'type', as this can mean almost anything from being a parallel interface with completely different wiring and signals, to being almost a Centronics, but devoid of any one signal or another.

I have been unable to find details of the 2230 printer — have you a wiring diagram of the pin-out? Is it just a case of the pins being in different positions, or are they different signals? If they are different signals then I am afraid that you are faced with a difficult conversion job. Maybe one of our readers has some experience with this printer?

WHAT IS CP/M?

Mr K L Roberts of Grantham Road, Sleaford, Lincolnshire, writes

Q **Can you please tell me what CP/M actually is? I know that it is used in business, is stored on a Disc, and needs a Z80a, but what actually is it? Does it replace the ROM? I have seen it mentioned with regard to the Spectrum and the new Sinclair business computer, whenever that appears. Is it worth getting if you plan to use your computer in business?**

A CP/M stands for Control Program/Management, and you are right, it does come on Disc, and needs a Z80 family processor to work. Now that the new Sinclair QL has arrived, or at least has been launched, it can be seen that it will not be able to Run CP/M without a Z80 board being available.

CP/M is a set of routines that replaces some of the ROM routines, in fact it acts more like a monitor. If, for example, the first routine of CP/M was to scan the keyboard, then regardless of the computer an instruction to do routine 1 will always be a keyboard scan if CP/M is being used as the operating system. Without CP/M, then each individual computer would have the routine at a different place, so what might be the address of a display routine in one, might be the address to access discs in another.

As long as a computer program uses just CP/M routines then that program becomes machine independent. However, there are cases where extra machines specific routines are added to software packages, these may be truly machine specific, or be usable on a family of computers. It does mean though that not every CP/M package will run on every computer that has CP/M capacity. A second source of confusion is that some CP/M packages do not allow you to specify the way your own system is set up. Thus if something goes wrong you might get, for example, an error when adding a third disc drive.

A real problem if you have not been able to re-configure the package to take into account the fact that you do not have three disc drives attached! Many non Z80 computers can Run CP/M if they have a Z80 expansion board. The other thing that must be noted is that just because the same routine is called, regardless of the computer it is Running on, how much machine actually executes that routine differs from computer to computer.

VIDEO DISC PLAYER

Eddy Daley of Redpath Walk, London E9, writes

Q **Our family is saving up to buy a Laser Vision Video Disc Player, which we hope to get soon. I would also like to get a computer before September, when I change schools.**

I know that Laser Discs can be used for computers, but looking through magazines I have not seen any advertisements. Can you suggest a home computer that I could use with Laser Discs? Also, how do the Discs work, and how much can they store?

A I would strongly suggest that you do not wait for a computer that is video Disc compatible. Video disc players are still few and far between, not to mention expensive. Any Laser Disc recorder is liable to be even rarer and even more expensive. Unless there is a major breakthrough, I do not expect to see any readily available commercial hardware for using the Discs with computers until at least 1985. Then allow another year for such developments to get into the home.

The fact is that technology is just not good enough to make massed use of lasers a reality at the moment.

The basic theory of Laser discs is that a Laser beam is used to cut minute holes into the disc. These holes are of different depths and reflect different amounts of light. This difference is then read by a reader beam.

The advantages are that the discs spin at over two hundred revolutions per second, which makes for very fast access. The track is spiral, like a record player. As for storage, well 1gK is claimed (1 giga-byte, or in other words, 1 million K). A double sided Disc is made by bonding two single sided Discs back to back.

Compared to other storage media, they are very hard wearing. This is because after a Disc has been cut, it is coated with a resistant plastic film for protection.

This unfortunately also gives a clue to one of the major problems of the discs. They cannot currently be wiped.

E Chorney of Chantenay Drive, Mississauga, Ontario, Canada, writes to tell me that, after my answer to B A Cummins in *PCW* Vol 2 No 50, that *Practical Electronics* has been carrying a series of articles on using the Vic's expansion port to control external devices.

> **Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke*, *PCW*, 12-13 Little Newport Street, London WC2R 3LD**

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WANTED, BBC Micro plus accessories Tel 0494 713703.

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SWAP Everest Ascent adventure pack 1 for other CBM 64 games. Tel 0782 817617

WANTED ADDON keyboard for Spectrum will swap for cordless phone, very good range autodial paging etc, cost around £100 Tel 0472 602445

ADVENTURE HELPLINE

Micro *Spectrum 48K*
Adventure *Espionage Island*
Problem *Can't get past the tank and can't climb the ledge*
Name *Mr Alan Bennett*
Address *21 Wimpole Street Liverpool 7 L7 2QP*

Micro *Commodore 64*
Adventure *Heroes of Khan*
Problem *I can't seem to get past the bear which is the swamp lizard?*
Name *Jason Dore*
Address *3 Park Drive Wickford Essex*

Micro *Sinclair Spectrum 48K*
Adventure *(1) Ship of Doom, (2) The Hobbit*
Problem *How do I insert magnetic key into keyhole (2) How do I stop getting recaptured having been carried throuth the Goblin's Dungeon window by Thorin?*
Name *John Hedges*
Address *Flat 5, 55 Oxford Road Littlemore, Oxford OX4 4QB*

Micro *Lynx 48K*
Adventure *Dungeon Adventure*
Problem *How to stop the Black Sphere from swallowing me, also what are the pedestals for?*
Name *J Payne*
Address *81 Derby Street Chadderton Oldham Greater Manchester OL9 7HJ 061 633 7988*

COMPUTER SWAP

COMPUTER SWAP

Computer Swap entries are limited to 30 words Either fill in the accompanying form and send to Computer Swap *Popular Computing Weekly* 12 13 Little Newport Street, London WC2R 3LD or telephone 01-437 4343

All software offered through computer swap must be in original condition and for private sale only

Warning It is illegal to advertise pirated software

Please write your copy in capital letters on the lines below

Name ....

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New Releases

EAT 'EM UP

After months of delay *Hurg* is available. This is a games designer in roughly the same general area as Quicksilva's *Games Designer*, but with a number of significant features of its own.

Like *Games Designer* you use a series of menu choices to design a game to your own specifications — choosing shapes and colours and planning movement. A full review will have to wait until a later date but obviously a quick comparison with *Games Designer* is a sensible thing to attempt.

In terms of range of options I think *Hurg* probably gives you more. If GD basically allowed you variations on the theme of 'shoot em up' *Hurg* allows you variations on 'eat 'em up' ie, Pacman, maze type games. The graphic movement looks not quite as smooth on a first impression, but is still more impressive than a good many Spectrum games currently being marketed.

Probably not a competitor with GD, rather a complement, which is good news for both Melbourne House and Spectrum owners.

Program *Hurg*
Price *£14 95*
Micro *Spectrum 48K*
Supplier *Melbourne House, Castle Yard House, Castle Yard, Richmond*

LIGHT WORK

Killer Watt is the latest program from Alligata software — a company building a fair reputation for Commodore software.

It is an arcade game in which a player has to find 12 light bulbs in an underground cavern, navigating his way through various rocky outcrops.

Baddies take the form of crazed bombers, flying fish, and birds, the last two being far more vicious than they sound. Assuming you survive these conventional terrors you have to face an unconventional magical gateway, destruction of which leads you to the next level.

It's all action packed stuff with good graphics and sound effects but then with the facilities on the Commodore 64 you'd hardly expect anything else, would you?

Program *Killer Watt*
Price *£7 95*
Micro *Commodore 64*
Supplier *Alligata Software, 178 West Street, Sheffield S1 4FT*

KILLER BIRDS

Thunderhawk is the best version I've seen yet of *Phoenix*, on the Spectrum. The problem with previous versions of this classic arcade game is that they didn't manage to properly emulate the bizarre flapping and swooping motions of the killer birds.

Thunderhawk uses sprite type movement and pixel graphics, ie, movement pixel by pixel rather than block by block to create a truly impressive game that Phoenix fans should love.

My only quibble is that your ultra powerful spaceship with which you are blasting away at the birds looks rather large and clumsy — hardly the sort of sleek battlecruiser we macho arcade types have come to expect.

Program *Thunderhawk*
Price *£5 95*
Micro *Spectrum*
Supplier *Lyversoft, 66 Lime Street, Liverpool L1 1JN*

Pick of the week

WAR EPIC

People occasionally complain that we don't mention Atari products often enough in new releases — there's a simple reason for this: we aren't sent any. In turn that's probably because there are few independent Atari suppliers.

However I have been sent *Warlock* which — in terms of number of stages and screens at least must be the arcade game to end all arcade games.

It comes on disc or cassette, the latter being loaded in four parts — a side of each of two cassettes for each stage. Epic is hardly the word.

The plot basically requires you to shoot wave after wave of aliens each with their own characteristics and vulnerabilities. You are not able to load later stage cassette sides without mastering the first level. By Atari standards and given the vast amount of program, it's cheap at £14.95.

Program *Warlock*
Price *£14 95*
Micro *Atari (32K)*
Supplier *Calisto Software, 119 Bright Street, Birmingham B1 1BE*

COMPLETE

One of the most thorough and indeed cheapest assembler packages for the Dragon 32 I've yet seen is *Ace Trace* which includes not only a monitor, assembler, dis assembler, but also an editor and a trace program.

The program is written in relocatable code and so can be located in a large number of positions. The trace will work on both Rom and Ram.

The assembler and disassembler support 6809 mnemonics and the code will also be displayed. The trace program shows the effect of your program on the Dragon registers.

The program comes with a manual that is no worse and slightly better than the average, although it doesn't profess to teach you machine code.

Program *Ace Trace*
Price *£14 95*
Micro *Dragon 32*
Supplier *M H Emerson, 61 Kingswood Road, Shortlands, Bromley, Kent BR2 0NL*

GARDEN GRUB

Well I suppose there aren't all that many versions of *Snake* for the Dragon 32, even though there are dozens for the Spectrum.

Willy's Revenge is what we're discussing here and to be fair to it, there are some features of the game that make it good by Dragon standards. For one thing, it is written in machine code — consequently it is fast and furious. There is a range of differently scoring objects in the garden for your snake to eat (all right, caterpillar) so some degree of tactical play comes into it.

Other than that the game involves moving an ever growing caterpillar around a garden — you simply try to survive as long as possible without bumping into anything or doubling back on yourself. Another point worth making — the game retails for £7 95 which is about average for Dragon software, although all the Spectrum versions of the game retail for £6 or less. Someone should tell Dragon software houses they are

charging too much

Program *Willy's Revenge*
Price *£7 95*
Micro *Dragon 32*
Supplier *Abacus Software, 21 Union Street, Ramsbottom, Nr Bury, Lancs*

RELEVANT

Optics is another BBC Educational program but it's more thorough and potentially more useful than most. In over 86K of actual program — loaded in several parts obviously — it covers more or less every relevant point about the subject for 'O' level.

The course is divided into 16 sections and BBC graphics are used to excellent effect in copious illustrations and ray diagrams. The program is largely undocumented and is also obtainable on disc for £12 99

Program *Optics*
Price *£9 99*
Micro *BBC B*
Supplier *Computsoft, 32 Watchyard Lane, Formby, Liverpool, L37 3JU*

FOUL TACTICS

Chariot Race is an arcade game that manages to ring a few original changes on an old theme, ie, racing around a track.

In place of the usual racing cars we have quite a fair graphical representation of chariots pulled by a team of four horses. Two players can compete against each other and the computer, which can control up to five chariots of its own. In the beginning these are slow and well behaved but as the game progresses the tactics get nastier and nastier.

Cowards are not tolerated by the crowd who will lob fireballs at any chariot going too slowly around the course. The main way to score in the game is to push opponents chariots into the walls.

It's all machine code and is one of the best original games I've seen on the Vic for ages. Charlton Heston eat your heart out!

Program *Chariot Race*
Price *£6 95*
Micro *Vic 20*
Supplier *Micro-Antics, Littlehome, Hawthorne Lane, Codsall, Staffs*

BASIC TAPE

One of the big problems with the Commodore 64 is its rotten Basic which doesn't allow you to use even half its graphics and sound possibilities without dozens of *Pokes*.

The solution in the past has been to buy *Simon's Basic* — a utility that gives you all the commands you should have had in the first place, but it's expensive — £40 or more.

Duckworth may provide a useful compromise. Its *Extended Basic* comes on a tape — less convenient than a cartridge, but only £18 50. Other than that it seems to offer much the same commands.

As you might expect, nearly all the commands are designed to make the graphics easier to use, particularly sprites. These are now simple to design using a *Shape* command and *Smove* to draw and move them.

Being in machine code the program takes up none of the available memory for Basic programming. There is a manual with the program that outlines the basic commands although they are no more difficult to use than conventional Basic.

Program *Extended Basic*
Price *£18 50*
Micro *Commodore 64*
Supplier *Duckworth/Bug Software, The Old Piano Factory, 43 Gloucester Crescent, London NW1 7DY*

GERMAN FUN

German is Fun is the latest in CDS Micro Systems' series of foreign language tutorial programs. If you accept that it will not teach you to 'O' level standard, but only give you some basic vocabulary and simple phrases it is superb — one of the best education programs I have seen on any micro.

At the simplest level you associate picture and words. You can choose your location — street, cafe, beach, etc and the computer gradually draws a pleasing picture telling you the name of each new object it adds. After this, some simple phrases are converted into German.

There are various other options within the program including a test on what you know. There are two reasons for the program's success: firstly it does not try to do too much — just sticking to basic nouns and verbs. Secondly, it is all technically well written so the drawing of the pictures is slick and impressive. Genuinely useful for those of us who find foreign languages baffling.

Program *German is Fun*
Price *£5 95*
Micro *Spectrum*
Supplier *CDS Micro Systems, 10 Westfield Close, Tickhill, Doncaster, S Yorks*

ON PARADE

I don't like *Space Invaders*. I never liked *Space Invaders*. All those rows of aliens marching back and forth like some idiotic military parade. On the other hand, I suppose you could claim that I am a little untypical in this opinion.

"N" Vaders is the first version of this old-age pensioner among arcade games for the Aquarius and an excellent version it is too, with all the expected features like an occasional mothership which wanders across dropping bombs.

The game is entirely in machine code and if you are an invaders fan you won't be disappointed. I like the way the game instructions keep referring to the aliens as a 'batch of coloured weirdos' — it tends to make them seem less threatening.

Program *N Vaders*
Price *£5 95*
Micro *Aquarius (+16K)*
Supplier *Add-on Electronics, Units 2 and 4, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ*

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to New Releases, Popular Computing Weekly, 12-13 Little Newport Street, WC2H 3LD



Top 10

Spectrum*

1 (2) Chequered Flag (Psion)
2 (1) Atic Atac (Ultimate)
3 (3) Flight Simulation (Psion)
4 (4) Lunar Jetman (Ultimate)
5 (–) Cyrus IS Chess (Psion)
6 (5) 3D Ant Attack (Quicksilva)
7 (7) Scuba Dive (Durrell)
8 (10) Pool (CDS)
9 (–) Kong (Ocean)
10 (7) Brothers (Imagine)
* All require 48K
(Figures compiled by W. H. Smith & Son, London)

Vic 20

1 (1) Computer War (Thorn-EMI)
2 (2) Megagalactic Camels Ieave at the edge of time (Llamasoft)
3 (4) Wizard and the Princess (Melbourne House)
4 (–) Brothers (Visions)
5 (8) Paratrooper (Rabbit)
6 (6) Arcadia (Imagine)
7 (6) Catcha Snatcha (Imagine)
8 (–) Gridrunner (Llamasoft)
9 (7) Wacky Waiters (Imagine)
10 (5) Jet pac (Ultimate)
(Figures compiled by Boots/Websters)

Commodore 64

1 (1) Chinese Juggler (Ocean)
2 (2) Manic Miner (Software Projects)
3 (3) Bugaboo (Quicksilva)
4 (4) Revenge of the Mutant Camel (Llamasoft)
5 (7) Mr Wimpy (Ocean)
6 (5) Megawarz (Interceptor Micros)
7 (8) Space Shuttle (Microdeal)
8 (–) Falcon Patrol (Virgin)
9 (10) Cosmic Convoy (Interceptor Micros)
10 (–) Hungry Horace (Melbourne House)
(Figures compiled by Boots/Websters)

BBC

1 (2) Rocket Raid (Acornsoft)
2 (1) Planetoids (Acornsoft)
3 (4) Killer Gorilla (Program Power)
4 (8) Chess (Acornsoft)
5 (3) White Knight Mk II (BBC)
6 (5) Monsters (Acornsoft)
7 ( ) 747 Flight Simulator (Microdeal)
8 (–) Sphinx Advanced (Acornsoft)
9 (6) Hopper (Acornsoft)
10 (–) Footer (Program Power)
* All Model B.
(Figures compiled by Micro Management, Ipswich 0473 59181)

ZX81

1 (5) Flight Simulation (Psion)
2 (3) Defender (Quicksilva)
3 (7) Brothers (Quicksilva)
4 (8) Krazy Kong (PSS)
5 (2) Football Manager (Addictive Games)
6 (–) Hopper (PSS)
7 (4) Space Raiders (Psion)
8 (–) Meteor Storm (Dk'Tronics)
9 (–) Mazogs (Bug-Byte)
10 (9) Espionage Island (Artic)
(Figures compiled by Boots/Websters)

Dragon 32

1 (1) Hungry Horace (Melbourne House)
2 (2) Eightball (Microdeal)
3 (3) Dragon Castle (Oasis)
4 (4) Ugh! (Softek)
5 (7) Leggit (Imagine)
6 (5) Up Periscope (Beyond)
7 (6) Devil Assault (Microdeal)
8 (–) Ring of Darkness (Wintersoft)
9 (9) Frogger (Microdeal)
10 (–) Scramble (Microdeal)
(Figures compiled by Boots/Websters)

Atari

1 (1) Rally Speedway (Adventure International)*
2 (–) Slinky (Cosmi)
3 (4) Saga 5 the Count (Adventure International)
4 (8) Zaxxon (Datasoft)
5 (–) Circus (Channel 8 Software)
6 (2) Enchanter (Infocom)‡
7 (–) Zork III (Infocom)†
8 (7) Wizard (Gebelli)‡
9 (9) Saga 4 Wizard Castle (Adventure International)
10 (8) Popeye (Parker Brothers)
*Cartridge. † 32K disc ‡ 32K cassette
(Figures compiled by Calisto Computers, Birmingham 021 632 6458)

Books

1 (4) BBC Micro Book, Basic, Sound and Graphics *McGregor and Watt* (Addison Wesley)
2 (2) Mastering Machine-code on Your ZX Spectrum *Baker* (Interface)
3 ( ) 30-Hour Basic, BBC edition, *Prigmore* (BBC/NEC)
4 (6) Advanced Programming Techniques on the Commodore 64, *Lawrence* (Sunshine)
5 (–) Programming the Z80, *Zaks* (Sybex)
6 (–) Forth for Micros *Oakey* (Newnes)
7 ( ) Advanced Graphics with the BBC Microcomputer *Angell and Jones* (Macmillan)
8 (7) 68000 Assembly Language Programming *Kane and Lawrence* (Osborne)
9 (3) Commodore 64 — Getting the Most From It *Onsake* (Prentice Hall)
10 (8) Starting Forth *Brodie* (Prentice-Hall)
(Figures compiled by Watford Technical Books Watford 0923 23324 Prestel 29844)
(Last week's position in brackets)

Book Ends

CAKE BAKING

With the likes of *Hobbit* and *Penetrator* floating around its sometimes easily forgotten that Melbourne House is partly a book publisher The latest addition to its range of books is *Book of Adventure* written by Computer and Video Games' Keith Campbell

It's a slim book but manages to cover a wide range, from adventure writing and history to reviews and listings

The annotations to the listings are very clear indeed and, assuming you want to write adventures of your own, are very useful The book has a forward by Scott Adams which is basically an extended metaphor on cake baking — ah, these crazy Americans

Book *Book of Adventure*
Price *£4 95*
Micro *Spectrum/BBC/CBM 64*
Supplier *Melbourne House*
Church Yard
Tring
Herts HP23 5LU

This Week

Program	*Type*	*Micro*	*Price*	*Supplier*
Animator	Ut	BBC B	£11 00	Screenplay
Chemistry	Ed	BBC	£8 00	Sel Tech
Chemistry 2	BBC	BBC	£8.50	Sel Tech
Database	Ut	BBC	£15 64	Penguin
Genealogy	Ut	BBC	£12.80	Sel Tech
Graph	Ut	BBC	£14 00	Sel Tech
Kingdom of Hamil	Ad	BBC	£8 64	Acornsoft
Molecule	S	BBC	£6 00	Bridge
Trafalgar	S	BBC	£8.00	Squirrel
Alley Oops	Arc	Commodore 64	£1 00	Alrain
Bridge	S	Commodore 64	£1 00	Alrain
Chemistry	Ed	Commodore 64	£8.90	Sel Tech
Chemistry 2	Ed	Commodore 64	£8.60	Sel Tech
Cosmic Bounce	Arc	Commodore 64	£1.95	Cable
Database	Ut	Commodore 64	£13 65	Penguin
Games for Children	Ed	Commodore 64	£5.95	Soft Shop
Genealogy	Ut	Commodore 64	£8.50	Sel Tech
Graph	Ut	Commodore 64	£14 90	Sel Tech
Match Up	Ed	Commodore 64	£14 64	Softchoice
Nursery Nightmare	Arc	Commodore 64	£7 90	Cable
Star Commando	Arc	Commodore 64	£7.95	Terminal
Time Zone	Ed	Commodore 64	£9 90	Softchoice
Triad	Arc	Commodore 64	£8.95	Sumlock
Word Bird	Ed	Commodore 64	£14.95	Softchoice
Animator	Ut	Dragon	£8 66	Screenplay
Geography	Ed	Dragon 32	£8 75	Cable
Klartz & the Dark Forces	Ad	Dragon 32	£8.95	Dungeon
Livine	S	Dragon	£8 75	Cable
Men Rority	Arc	Dragon 32	£1.95	Screenplay
Pro-file	Ut	Dragon	£15.75	Cable
100 Programs for Spectrum	Ut	Spectrum	£10.00	Prentice/Hall
Biology 2	Ed	Spectrum	£4 00	Kisoft
Chemistry	Ed	Spectrum	£8.96	Sel Tech
Chemistry 2	Ed	Spectrum	£4 95	Kisoft
Chemistry 2	Ed	Spectrum	£8.50	Sel Tech
Database	Ut	Spectrum	£13.95	Penguin
Di-Lithium Lift	Arc	Spectrum	£8 00	Hewson
Diet	Ut	Spectrum	£8 00	Softchoice
Dynamic Graphics	Ut	Spectrum	£14.99	Procrom
Felix	S	Spectrum	£8.95	Softricks
Genesology	Ut	Spectrum	£12.50	Sel Tech
Graph	Ut	Spectrum	£14.99	Sel Tech
Henry IV Part 1	Ed	Spectrum	£8 64	Penguin
Julius Caesar	Ed	Spectrum	£5.95	Penguin
Macbeth	Ed	Spectrum	£8 64	Penguin
Maths	Ed	Spectrum	£4.95	Kisoft
Mazecute	S	Spectrum	£4 95	Pal
Merchant of Venice	Ed	Spectrum	£5.95	Penguin
Newmarket	S	Spectrum	£8.80	Richard Coushman
Night Rally	Arc	Spectrum	£8.00	Spider
Physics 1	Ed	Spectrum	£4 99	Kisoft
Physics 2	Ed	Spectrum	£4 94	Kisoft
Romeo and Juliet	Ed	Spectrum	£8 95	Penguin
Baspazents	Ut	Spectrum	£7 64	Red Rom
Twelfth Night	Ed	Spectrum	£8 95	Penguin
Word Processing	Ut	Spectrum	£8.95	Kisoft
Devil Crase	Arc	TI99 4A	£6 90	Maple Leaf
Hang Glider Pilot	Arc	TI99-4A	£8.00	Maple Leaf
Happy Maths	Ed	TI99-4A	£6 90	Maple Leaf
Pengi	Arc	TI99 4A	£8 00	SP Software
Phonics Tutor	Ed	TI99-4A	£8 90	Maple Leaf
Sky Diver	Arc	TI99/4A	£8 90	Maple Leaf
Spelling	Ed	TI99-4A	£6 90	Maple Leaf
Calc-Pro	Ut	Vic 20	£8 60	Softchoice
Graph It	Ut	Vic 20	£9.80	Softchoice
Eastword	Ut	ZX81	£7.60	Softchoice
Fastload	Ut	ZX81	£7.50	Softchoice
Speedsnate	Arc	ZX81	£4.95	Softchoice
Tiny Logo	Arc	ZX81	£8 95	Softchoice
Wrath of Kong	Arc	ZX81	£5.95	Softchoice

Key: Ad — adventure/Arc — arcade/Ed — education/ S — strategy simulation/Ut — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to This Week, Popular Computing Weekly 12-13 Little Newport Street, London WC2H 3LD



MoD discretion

Discretion is supposed to de a good thing But as the recent JLC secrecy case shows, too much discretion in the hands of the authorities can produce very unfair results

JLC Data came up with a method for protecting computer programs and other on-line data including (possibly) telephone calls When it applied for a patent to protect its rights to use the invention the company was served with a secrecy order stopping it from revealing any details of the new invention to anyone else

The power to make such an order has been around for a long time — since well before the turn of the century But in those days it only applied to instruments or munitions of war Now the power is much broader and applies to anything which is prejudicial either to the defence of the realm or to public safety

When you apply for a patent the Patent Office reads through a description of your invention The Ministry of Defence provides the Patent Office with confidential guidelines so that it can recognise anything which might potentially be of interest to the ministry If the Patent Office spots something likely it serves a secrecy order

This is where the discretion comes in Details of the invention (with the consent of the inventor) are then sent to the MoD which decides whether or not the secrecy order should be continued

It is entirely up to the ministry whether the invention is kept secret — there is no appeal Also it is completely at the MoD s discretion whether any compensation is paid to the inventor for the loss of the work — and if so how much The MoD also has another power — crown use If it decides that it can make use of the particular invention itself it can take it over It must pay compensation — but again the amount is up to the ministry

To de fair the MoD doesn t seem to have used its powers excessively so far Although about five per cent of patent applications are referred to the MoD by the Patent Office only one in seven is usually the subject of any long lasting restriction And most of these result from Government defence contracts where the inventor and the Government both already know that the work is going to de classified as 'secret

So JLC needn t give up hope The Patent Office refers patents to the MoD on the basis of trigger words For example atomic (try patenting an Atomic Easter Egg and see what happens) It is not until the Mod sees the details that it can sort out the wheel from the chaff

But the fact that such far reaching powers are given to the MoD must be a bit disturbing The implications of these powers have never been fully considered The question wasn t debated either by the committee which reviewed patent law in 1970 or when the Patent Act 1977 was passed by the Houses of Parliament

The current position leaves too much discretion in the hands of the MoD The MoD may de in a good position to decide whether details of a new weapon should de published But is it in a position to have the final say between such competing public interests as the needs of the software industry to combat piracy and the needs of the defence establishment?

Any decision by the MoD that JLC Data s invention should be kept secret may in the end prove to de utterly futile If someone living in another European country patents a similar invention there then there will be next to nothing the MoD can do to prevent it being sold here

The final irony is that if JLC Data had not attempted to patent the invention in the first place the MoD would have been powerless

Gail Counsell

House calls

Puzzle No 97

I discovered a remarkable thing about my house number recently

If you start at the end of the road outside No 1 and walk along adding together all the house numbers on my side of the road up to but not including my house number the total is equal to the sum of all the house numbers beyond my house still on the same side of the street to the end of the road The houses are all numbered conventionally with consecutive odd numbers and there are no missing numbers

As a clue my address has three digits Can you tell what its number is and also the number of the last house on my side of the street?

Solution to Puzzle No 92

Sue has bought 14 towels (£7) eight tablecloths (£8), two saucepans (£10) and one set of cutlery (£5)

```
10 FOR B = 2 TO 38 STEP 2 20 FOR T = 1 TO 14 30
FOR S = 2 TO 6 STEP 2 40 FOR C = 1 TO 3 50 LET P =
B * .5 + T * 1 + S * 2.5 + C * 5 60 IF P = 25 AND B +
T + S + C = 25 THEN PRINT B T S C 70 NEXT C 80
NEXT S 90 NEXT T 100 NEXT B
```

In the program, the four *For/Next* loops work out all possible combinations of articles and their prices The upper limit of each loop is determined by the number of that particular item that could be bought for £25 minus the cost of at least one of each of the other items.

Running the program shows that Sue bought 14 towels (£7) 8 table cloths (£8) two saucepans (£5) and one set of cutlery (£5)

Winner of Puzzle No 92

The winner is A J MacLaren Coul Park Alness RossShire who receives £10







but seriously, **AUTOMATA**

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WHAT'S GOING ON? WHERE'S THE PIMAN? WHERE'S LADY CLAIR?
WE DUNNO! THEY HAVEN'T TURNED UP YET. YOU'LL HAVE TO GET SOMEONE TO FILL IN!
OKAY I'LL PHONE AROUND THEN!
RIGHT WELL UNTIL THEY GET SOMETHING SORTED OUT, I'LL ENTERTAIN YOU!
UM-WELL AHEM I'VE GOT A BIRTHDAY MESSAGE
HAPPY BIRTHDAY ASH, FROM TOG!
FEBRUARY 23rd BUT WHAT THE HECK
IT WAS ALSO MY PAL NICK'S BIRTHDAY ON THE 2nd OF MARCH
AND ME MUM'S ON THE 1st
HULLO
BUT SAVE YOUR BIRTHDAY REQUESTS ETC, FOR THE PIMANIACS CLUB - COMING SOON (I HOPE)
BAM BAM THUMP
AH! THE DOORBELL! SOMEONE'S COME TO HELP ME OUT
WOTCHER! I'M GORMAN EVANS - WE NEED SOMEONE TO DO THIS WEEK! AH
DIAMOND DAN DIAMOND JUST REMEMBER I'M ON LOAN THERE'S A KID TOO ...
BUT I SENT HIM TO A SOFTWARE SHOP TO DO A PLUG
EXCUSE ME MISTER
HAVE YOU GOT PIMANIA?
NO IT'S THE WAY I WALK!
WELL HAVE YOU GOT UNCLE GROUCHO?
I'VE GOT AN AUNTIE ETHEL IF THAT'S ANY GOOD
HOW ABOUT MORRIS AND THE BIKERS?
I DUNNO YOU COULD ASK THEM
HAVE YOU GOT PI EYED?
NO I'M SOBER AS A JUDGE!
HEY THESE ARE GAMES, NOT FEED LINES! HOW ABOUT PI-BALLED? GO TO JAIL? YAKZEE?
LOOK, SONNY, IF THOSE ARE REAL GAMES WHY AREN'T THEY LISTED BY MY WHOLESALER?
YOU'RE BUYING FROM THE WRONG WHOLESALER, THAT'S WHY!
CUTHBERT COURTESY MICRODEAL LTD.
MICRODEAL, LOGIC 3 & CHECKMATE FOR AUTOMATA PRODUCTS!!
END OF PLUG
I SUPPOSE THE OTHERS ARE IN HIDING AFTER THE BIG SATIRICAL AXE ON THE AWARDS THING A FEW WEEKS BACK. THEN AUTOMATA GOT AN AWARD, AND SO DID PCW, NOW ALL I GET IS THE BLAME, BECAUSE THEY ALL SAID I WROTE IT. I DIDN'T, THOUGH WELL, SOME...
TOO BAD KID. SAY CAN I WISH MY BROTHER ALGIE A HAPPY BIRTHDAY?
OKAY WHAT'S GOIN ON? WHO'S THE GANGSTER?
GANGSTER?
YOU'VE GOT A CHEEK! COMING IN 11 PANELS LATE, ASKING ME WHAT'S GOING ON? WHERE ARE THE OTHERS?
THEY'RE COMING! NOW, TELL SAM SPADE HERE TO GET ON HIS BIKE, AND YOU HOP IT TO THE OTHER END OF THE BRUSH
PSSHHT!
TOO HORRIBLE, SCRUFFY ARTISTS! I BET HE'S HAD THOSE SOCKS ON ALL WEEK!
THAT IS A SCANDALOUS FIB! AH HERE COME GROUCHO AND THE PIMAN...
C'MON SHORTS! FASTER. KEEP IT UP!
CAN'T YOU SLOW DOWN TO 40 MPH?
GROUCHO PUTS THE PIMAN THROUGH A KILL NO PACE ALL DAY... BUT HE'S STILL ALIVE
THREE THOUSAND, 1 HUNDRED AN... OH, I LOST COUNT- START AGAIN.
GUB
I KNOW HE'S GOT TO GET FIT. BUT MIND YOU DON'T BUST HIM!
RELAX! HE'S A REGULAR FUDGE MUSCLE
YEAH, I'VE NOTICED THAT
HI THERE! HOW'S THE ATHLETE MAKING OUT?
HE'S IN THERE- TAKE A LOOK!
HI, BOSS!
EGAD WHAT HAPPENED WITH THE OTHER ARM?!
WE CAN ONLY AFFORD THE ONE DUMBELL!
OH WHAT A FARCE!
YEAH, BUT WE'RE WORKIN' ON THAT!
NEXT "TIME" GRETA GARBO VERSUS GODZILLA !! HO-HUM